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ABSTRACT

As the final report of a 2-year research project, this document covers work on the development of a model of anaphora and its implications for a theory of writing development. The report outlines results from a series of experiments that specified several functions of pronouns in prose and that tested hypotheses concerning the development of anaphora in good and poor elementary and junior high school writers. Section one of the report discusses a series of experiments that study the functions of pronouns and repeated noun phrases in text comprehension. Section two describes studies on the development of these pronominal functions in children's narrative writing. Section three reports on several experiments examining children's skill in revising ambiguous pronouns and repeated noun phrases. Section four discusses methodological issues concerning sample selection and the effects of various stimulus materials on children's output. Seven appendixes contain reports of the research cited in the text. (RL)

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FINAL REPORT

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Final Report

NIE-G-78-0170

Anaphora: Theory and Its Applications to Developmental Research

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Introduction

This final report covers work supported by NIE grant #NIE-G-78-0170 and done between July 1, 1978 and June 30, 1980. The project was funded to develop a model of anaphora and to examine it implications for a theory of writing development. During the grant period, most of the experiments outlined in the reserach proposal were completed, enabling us to specify several functions of pronouns in prose and to test hypotheses concerning the development of anaphora in good and poor elementary and junior high school writers.

In our research proposal, we sketched a model that at the time we felt represented the processes involved in interpreting anaphora. The crucial feature of the model was a set of elimination rules that could bear on a list of possible antecedents. Presumably, in cases of unambiguous coreference, the rules would eliminate every possible antecedent except one and the anaphor would be bound to this remaining antecedent. The research we outlined had as a goal the articulation of these rules and the specification of the processes by which the rules eliminated an item from the list.

As the research progressed, we discovered that the goals we stated were too narrow and that rules of elimination did not have the direct bearing on writing that we originally thought they did. We had hoped to use the model of anaphora assignment developed with adult subjects to study the writings of children. While it is probably impossible to study writing skills without understanding the process of reading and comprehending, we soon began to realize that our

initial proposals did not map out clearly the connection between comprehending and writing.

In order to study the development of writing skills in children, some clear and well founded means of making judgments about the quality of the texts children produce is needed. In particular, we want to record the various ways children construct anaphoric expressions and make some judgment about the ease with which these can be interpreted. A writer can refer back to a previous noun phrase in many ways, for instance by repeating the noun phrase or by using a pronoun; however, in choosing a device, a writer must make sure that the intended coreference is unambiguous or at least clear.

Often any one of a variety of anaphoric devices can be used without any loss of clarity. For instance, in a story about a man and two women, a writer may refer to the male as the man or he. One question of considerable interest concerns how writers choose among these alternatives and whether a choice has consequences for aspects of comprehension other than those involved in establishing clarity of reference. For example, it is possible that anaphoric language serves not only to direct co-referencing but also to provide listeners or readers with important signals concerning episodic structure, narrative point of view and thematic organization of sentences. These aspects of anaphora are explored in the following sections.

In Section One we discuss a series of experiments that study the functions of pronouns and repeated noun phrases in text comprehension. In Section Two we describe studies of the development of these functions in children's narrative writings. In Section Three we describe several experiments that study children's skill in revising ambiguous pronouns and repeated noun phrases. In Section Four we discuss several methodological issues concerning sample selection and the effects of various stimulus materials on children's output.

Section One: Functions of pronouns and noun phrases in text comprehension

Understanding discourse involves more than parsing a sentance, mapping it into its underlying logical forms and constructing a semantic representation. Discourse consists of an ordered sequence of sentences, and a listener must piece together the independent meanings of the individual sentence to capture the meaning of the discourse as a whole. This process of "piecing together" is usually referred to as integration.

Clark and Haviland (1977) have proposed the bare outlines of a model of integration, based on the given/new contract. At the core of their proposal is the distinction between given information -- information that the speaker believes the listener knows and accepts as true -- and new information -- information the speaker believes that the listener does not know. Integration occurs in a three-stage process according to Clark and Haviland: Listeners compute what is given and what is new in an utterance, search memory for an antecedent of the given information, and then add the new information to memory. Thus, on encountering The beer was warm in a sequence such as:

John got some beer out of the car. The beer was warm.

a listener would first isolate the given from the new information: in this case, The beer was X might be the given and X=warm, the new. Once the given is separated from the new, the listener would then search his or her memory for the antecedent of The beer and on finding it, add to his or her memory representation the new information that it was warm. Clark and Haviland have noted that if the given information is not directly represented in memory, then the listener must build a bridge between what is present in memory and the given information. Bridging, for instance, occurs in:

John got some picnic supplies out of the car. The beer was warm.

In this sentence pair, beer is not mentioned in the first sentence. Haviland and Clark (1974) have shown that bridging takes time. It is easier to comprehend The beer was warm when it is preceded by John got some beer out of the car than when it is preceded by John got some picnic supplies out of the car.

The Clark-Haviland proposal leaves much unsaid, of course. For instance, how does a listener isolate given from new information, the first step in their three-step model. To be sure, many linguistic devices highlight what is given or new. When one writes "The beer was warm," the definite determiner the marks the noun phrase as conveying given information. But such obvious markers are not always present. Take for instance the simple declarative "Olivia kissed Oscar." Clark and Haviland suggest that one can determine what is new or given by finding what questions the declarative sentence answers. The problem with "Olivia kissed Oscar" is that it answers three quite distinct questions, as Clark and Haviland pointed out. That is, "Who did Olivia kiss?" "What did Olivia do?" and "What happened?" Thus, the given information might be either "Olivia kissed someone," "Olivia did something" or "Something happened."

The difficulties of a reader go beyond simply the problem of separating given from new. Current work on language comprehension indicates text is first storied in a working memory and from there integrated into long term memory, clause by clause. The less time any incoming speech must be held in working memory, the easier it is for the listener.

The importance of these findings to the present discussion is that information can only be swapped from working memory to long term memory after the antecedent is found and, to go one level of analysis deeper, the antecedent can be found only after given is isolated from new. Thus, it is to the advantage of the reader to make the separation as soon as possible. And it is well for a writer to make it a s easy as possible for the reader to do this.

When can a reader safely conclude that he or she has specified what is new and what is given? That is, when does integration begin?

In addressing these questions, we might begin by considering the pronoun. Pronouns are one of the better understood linguistic devices for text cohesion. Their frequent use, however, invites a paradox: Why would a writer use a pronoun

when the repetition of a noun phrase would do? A simple matching routine would be enough to find the antecedent of a repeated noun phrase, but complex syntactic lexical and pragmatic restrictions would have to be built into any mechanism that would successfully evaluate candidate antecedents of pronouns. This increased complexity suggests that pronominalized clauses should take longer to comprehend than clauses with repeated noun phrases. Why would a writer or speaker employ an anaphoric device that places added burdens on the listener or reader?

Obviously, an anaphoric pronoun may be used in preference to a repeated noun phrase for stylistic variation, but a deeper explanation is possible. Non-pronominalized noun phrases can introduce new characters, events, ideas or objects as well as serve an anaphoric function, but pronouns, at least non-deictic personal pronouns, can only act anaphorically. It would be sensible, on linguistic grounds, for a listener to attempt to connect information in a pronominalized clause with the content of previous text as soon as possible while remaining less committed to integration when a repeated noun phrase is used. Pronouns, then, may serve a distinct discourse function: readers (and writers) may prefer them over repeated noun phrases because they facilitate integration. That is, pronouns tell the reader when to integrate whereas repeated noun phrases do not provide the necessary cues.

One consequence of this proposal is that text with pronouns should be easier to comprehend or integrate than the same text with the pronouns replaced by repeated noun phrases. Hirst, Levine & Henry (submitted for publication; see Appendix A) have provided extensive experimental support for this conjecture. For instance, they showed that people can remember more of the gist of a text if pronouns are used instead of repeated noun phrases. Moreover, they showed that comprehension of a sentence embedded in text was faster if the subject was a pronoun than a repeated noun phrase.

One of the most interesting results of Hirst, Leving & Henry involved an

adaptation of the running memory span paradigm explored by Jarvella (1971). Subjects listen to a tape recording of a story and without warning are asked to recall the last two sentences heard. Jarvella found that subjects remembered the last sentence quite accurately, but verbatim memory fell off for the penultimate sentence. He argued that people process text clause by clause. The last clause is stored in short term memory; previous text is integrated into long term memory.

If pronouns do serve as markers to integrate, then integration should begin shortly after a pronoun is encountered. With a repeated noun phrase, the verbatim representation of the clause should be maintained until it is clear whether a new character is being introduced or an old character is repeated. Thus, a pronominalized clause should lose its verbatim representation in memory more quickly than a clause with a repeated noun phrase.

Subjects listened to stories that were interrupted at various points. They had to recall the two sentences before the interruption. For half the subjects, the penultimate sentence had a pronominalized subject; for the other half, the pronoun was replaced by a repeated noun phrase.

The crucial comparison was between the verbatim recall of the penultimate sentence in the pronoun format and repeated noun phrase format. It was found that verbatim recall was better for the repeated noun phrase format than the pronoun format. Subjects were more likely to integrate the information in the pronominalized sentence than they were information in the repeated noun sentences.

In each of the experimental sentences used in this experiment, and the others in Hirst, Levine & Henry, the antecedent always preceded its pronoun. But in special circumstances, the antecedent can follow its pronoun, so called backwards pronominalization. In such structures, integration should be held off until enough information is gathered to determine whether the pronoun refers to a preceding noun phrase or onethat follows. Linguists have established that backward

pronominalization can occur if and only if the pronoun precedes its putative antecedent and is the subject of a subordinate clause. That is, the pronoun is always marked witha subordinate conjunction to indicate possible backward pronominalization.

Hirst (in preparation) examined whether the normal discourse function of pronouns -- to facilitate integration -- is suppressed when the pronoun is precededed by a subordinate conjunction. Again, a variant of Jarvella (1971) was used. Subjects heard sentences that (a) began with a subordinate conjunction containing a pronominalized subject, (b) began with subordinate conjunction containing a subject as a repeated noun phrase, (c) began with a main clause containing a pronominalized subject, and (d) began with a main clause containing a subject as a repeated noun phrase:

(a) As she saw a rat in the corner of the living room, Mary ran out of the house.

(b) As Mary saw a rat in the corner of the living room, she ran out of the house.

(c) She saw a rat in the corner of the living room as Mary ran out of the house.

(d) Mary saw a rat in the corner of the living room as she ran out of the house.

The sentences were written so that each sentence was transformed into all four formats. Formats (c) and (d) were the same as those examined in Hirst, Levine & Henry. As found in Hirst et al., subjects' verbatim memory was better for sentences in format (d) than format (c). This difference did not appear when the crucial clause was a subordinate clause, however. That is, no difference was found between the verbatim recall of sentences in format (a) and those in format (b). Thus, pronouns did not facilitate integration when preceded by a subordinate conjunction.

Other experimental support for this hypothesis used a priming paradigm

developed by McGoon & Ratliff (1980). Subjects read from a CRT the same stories used in the above experiment, one word at a time. Only the first one or two words of the experimental sentence were presented. Thus, subjects saw: "After she," "After Mary," "she" or "Mary" instead of the entire sentence. Immediately following these words, subjects were asked if (1) Mary had been mentioned in the story and (2) if some attribute ascribed to Mary had been described in the story. As a control, subjects were occasionally asked if (1) Harry, another story character, had been mentioned and (2) if some attribute ascribed to Harry had been described in the story. If pronouns initiate integration, then "he" should act as a prime. The main interest here is whether "After he" also acts as a prime. Preliminary evidence suggests that it does not.

These experiments provide convincing evidence that pronouns facilitate integration when their antecedent must precede them. Moreover, people appear to be sensitive to the various linguistic constraints on this principle. Presumably, pronouns make it easier for a reader or listener to discriminate new from given and in doing so, ease the burden that the steady stream of discourse places on memory.

Integration and Assignment

After a reader separates given from new, she or he must search for the antecedent of the given. As we have noted already, search mechanisms can be quite complex. This is unfortunate, since the advantage gained from facilitating the step of isolating given from new is lost when the search process begins. The reader must hold off connecting the new information with relevant material in long term memory until the antecedent is found in memory. In the Clark/Haviland model, the process of finding the antecedent and the following process of binding the new information to the discovered antecedent are quite distinct, the former preceding the later. The motivation for this separation is clear enough: It is hard to imagine binding without first knowing the binding site. Despite the intuitiveness

of this two step process, a reader might not hold off connecting the information in the pronominalized clause with what is already known, but attempt to form various connections among different events before he or she is clear about the antecedent. In this case, the putative separation between search for an antecedent and binding new information up with prior information does not exist. A pronoun not only facilitates integration but its antecedent emerges from this integration.

Hirst and Brill (1980, reproduced in Appendix B) provided evidence for this hypothesis. In particular they showed that pronoun assignment is governed by contextual constraints even when a reader could complete the assignment using syntactic constraints alone. Since contextual constraints can only be appreciated with integration, it was argued that integration must occur during assignment, not following it.

The research as outlined here presents the beginning of a model of the functions pronouns serve in discourse. Research is continuing. In particular, we are exploring those instances in which repeated noun phrases are preferred to pronouns.

Section Two: Children's use of pronouns and repeated noun phrases in their written narratives

As outlined in our proposal, we also investigated anaphora in narrative texts produced by more and less skilled elementary and junior high school age writers. Roughly speaking, we can conceive of text production as a process of language selection. In any given context, as we have noted, several candidate anaphoric devices might be considered by a writer. The question addressed by our research is how young writers choose among them.

Many factors are likely to affect a writer's choice. For one thing, choice will depend on the semantic features carried by a device. Writers must make certain that these will distinguish among alternatives in a particular context so that appropriate integration may occur. For example, if a context includes several same gender referents, then pronouns and nouns which encode only

distinctions of gender may be poor choices, as in (1) and (2):

(1) One day two girls set out for the park. She had a bike....

(2) One day two girls set out for the park. The girl had a bike....

Choice clearly depends on other factors as well. For example, data in Clancy (1980) suggest that in adult narratives, choice of anaphoric language may depend on aspects of text structure. In her study, Clancy examined frequency with which pronouns, nouns and ellipses were used to accomplish anaphoric reference in spoken narratives produced by twenty American adults; and while she found that (as Hirst's model leads us to expect) pronouns and ellipses were by far the most frequent devices, nouns seemed to be the preferred device in certain contexts. Nouns were used in situations where major junctures or discontinuities seem intended, for example at the beginnings of new story episodes. Nouns were also more frequent in contexts where speakers seemed to intend a break in the continuity of given and new information. For example, while pronouns and ellipses were generally used when speakers maintained a referent as sentence subject, a position generally reserved for given information, nouns were almost always used when a switch in sentence subject seemed intended. For example:

(3) John got into an argument with Charlie. Then he hit him and knocked him down.

(4) John got into an argument with Charlie. Then Charlie hit him and knocked him down.

The importance of having rapid access to given/new information has been stressed in Hirst's model and no doubt accounts for the special care which speakers take to indicate these changes.

Choice of anaphoric language may be related to other aspects of text structure as well. For example, drawing on the work of Kuno and Kaburaki (1977), Clancy argues that patterns of pronoun/noun choice reflect distinctions in narrative point of view, with pronouns serving to indicate the point of view with which a reader is to empathize.

Taken together, these observations suggest that patterns of adult anaphora are subtle and complex, depending not only on semantic properties of candidate devices, but on the structure of an evolving text. In other words, anaphoric language may serve not only to direct co-referencing, but may also provide listeners or readers with important signals concerning episodic structure, narrative point of view and thematic organization of sentences.

The purpose of the present research has been to investigate factors affecting language choice in narratives produced by children in grades five through seven who are judged by their teachers to be above- or below-average in current writing skill. Existing research as outlined in our proposal suggests that children are likely to have difficulty using anaphora to signal definite co-referential relations and their choice of anaphora may provide readers with inappropriate or incoherent signals concerning text organization. Data in Bartlett & Scribner (1982) indicate that many problems seem to occur in contexts where two or more same-gender referents must be differentiated, contexts in which it is difficult for writers to use pronouns and certain common nouns (the girl, the boy) unambiguously. Other devices can be used, of course, depending on the amount of differentiating information in a text. Data in Bartlett & Scribner however, suggest that even when potentially differentiating information is available (e.g., character names and descriptions) children do not always take advantage of it in their referencing.

Bartlett & Scribner's observations are interesting but provide at best only very general speculation about the source of children's referential difficulties. For example, although most ambiguities involved pronominalization, it is unclear whether the successful writers succeeded because they used fewer pronouns in general or because they avoided pronouns only in difficult (same-gender) contexts. Similarly, were the more successful writers more likely to include potentially differentiating information in their stories (i.e., character names)

or were they just more likely to use such information in their referring expressions? Additionally, were more successful writers more adept at using anaphora to signal text organization: was their greater coherence related to the use of more adult-like anaphora (i.e., increased use of nouns) to indicate beginnings of new episodes or changes in thematic focus? Finally, although Bartlett & Scribner noted that individual differences in referencing occured (i.e., about a third of the children at each grade level produced no referential ambiguity at all), no attempt was made to relate these differences to subject variables: for example, were the children who produced successful referencing judged to be better writers in general?

The present research extends the work of Bartlett & Scribner by addressing these questions directly. In addition, several other questions are asked, relating to the effects of elicitation procedures on referential language. In designing the research, our strategy has been to vary the difficulty of contexts in which referring expressions are constructed by providing children with specific content for their stories (i.e., children are asked to write about events pictured in seven-panel cartoons). This strategy raises additional questions concerning the effects of providing specific content on children's anaphora. In particular, we wonder whether some difficulties in accomplishing referencing may be due to problems organizing a consistent, coherent event structure for stories and we predict that overall, more and less skilled children will produce fewer referential ambiguities in situations where they write about specified series of events than when they must invent event structures of their own.

The results of these investigations are presented in Bartlett (submitted; reproduced in Appendix C). They can be summarized as follows:

When we compare referring expressions produced by above- and below-average writers in texts elicited by the difficult-context cartoon (i.e., where three same-age, same-gender characters must be differentiated) with those produced in texts elicited by the easy-context cartoon (where differentiation is not necessary) we find (as expected) that below-average writers produce more ambiguity than above-average writers in the difficult context condition. Moreover, linguistic analyses show that the types of ambiguities produced by the two groups differ: while above-average writers produce equal amounts of ambiguous nouns and pronouns in the two conditions, almost 80% of the ambiguities produced by below-average writers in the difficult context condition involve ambiguous pronouns. One possible reason for this difference may be that below-average writers are relying on the use of pronouns to accomplish referencing regardless of context. In the case of the cartoon texts, this would result in adequate referencing in the easy-context condition but would lead to increased pronominal ambiguity in the difficult condition.

This hypothesis is tested by comparing noun and pronoun use in the two conditions. A significant task by level interaction, presented in Table One, shows that, in fact, children in the two groups do differ in their anaphoric language. While the two groups use comparable amounts of pronouns and nouns in the easy context condition, above-average writers decrease their pronoun use and increase their noun use in the difficult condition, presumably in response to constraints of the context on pronoun use. By contrast, the referential language of below-average writers does not change, indicating a relative insensitivity to the effects of the difficult context on language use.

A simplified pronoun-use hypothesis would predict that below-average writers would also be insensitive to other textual constraints. For example, it would predict relative insensitivity to the effects of changes in sentence topic, as indicated by changes in sentence subject referent from one sentence

Table One

Use of pronouns and nouns in easy and difficult context conditions

	Above-average writers		Below-average writers	
	Easy context	Difficult context	Easy context	Difficult context
pronouns	18.19	15.7	17.86	18.41
nouns	16.85	18.82	17.98	17.95

to another. In particular, the hypothesis would predict that while above-average writers would be more likely to adopt an adult-like pattern of referential language, using nouns more often than pronouns to indicate a switch in sentence subject referent, below-average writers would use pronouns predominately in both switch-subject situations and in situations where a subject referent is maintained from one sentence to the next. Comparisons of language in the two situations, however, show that below-average writers are as sensitive as above-average writers to the effects of topic or thematic focus on language use: all children in all task conditions tended to follow the adult pattern of language use, increasing their use of nouns substantially in situations where a switch in sentence subject referent seems intended.

These results suggest that our initial hypothesis requires some modification. Although it seems true that below-average writers' choice of wording seems relatively insensitive to constraints of referential context (i.e., the characteristics of potentially confusable referents), they seem as sensitive as their above-average classmates to the effects of topic on language use. Among other things, this suggests that these two aspects of language use may draw on somewhat different sets of skills.

Inappropriate use of pronouns accounted for most of the ambiguities observed in below-average writers' difficult context texts. However, ambiguous nouns also occured. Analyses of these sheds further light on differences between

above- and below-average writers' referential strategies. For the most part, when ambiguous nouns occured in children's difficult context stories, they occured when children attempted to use nouns to distinguish between (or make reference to) one of a pair of unnamed characters (usually one of the two helpers). At times, the problem occured when children attempted to use words such as the other or another to refer to a second character in situations where the first had already served as the focus of attention. For example:

> ...so the boy got hold of the stick and the other boy started to pull but the stick broke so the other boy skated as fast as he could and got a hockey stick....

In other cases, the problem seemed to involve omission of these distinguishing words in situations where some sort of distinguisher seemed required:

> The other boys were trying to help him. One boy broke a branch and the other went for a hockey stick. The boy hurried to the crack but when the boy got the branch the branch broke in half....

These two problems accounted for 70% of the ambiguous nouns in below-average writers' cartoon stories, but were considerably rarer in stories of above-average writers, partly because these writers produced few ambiguities overall and partly because their ambiguities involved a more heterogeneous set of difficulties (e.g. use of one character's name for another; omission of any information about the identity of a speaker during an exchange of dialogue; switching from third to first person reference in the midst of a story episode).

No doubt below-average writers' faulty use of words such as the other or another (as well as failure to use such terms when required) reflects their lack of knowledge about how these terms work. But the relative frequency of these problems in below-average writers' texts may also reflect certain aspects of their basic narrative strategy. To see how this might be so, it is necessary first to note that the problems encountered in using these terms might have been avoided altogether had writers chosen to use character names. That

they do not do so in any particular instance may reflect strategy at the level of word choice (e.g., a preference for terms such as the other over names in situations where both are available) or strategy at the more basic level of narrative realization (e.g., a decision about whether to provide names for characters in the first place). To determine whether, in fact, above- and below-average writers differed in the strategy of providing names for characters, number of named characters across the two conditions was compared. Results show that above-average writers were indeed more likely to name characters ($\bar{X}$ above-average writers=2.6 named characters per story; $\bar{X}$ below-average writers=2.0 named characters per story) and that this was true across all grade levels and in both task conditions. It would follow that names would be less likely to appear in the referring expressions of below- than above-average writers and as the data in Table Two show, this was in fact the case: although names were by far the preferred form of non-pronominal referring expressions, they were nonetheless more likely to be used in the texts of above- than below-average writers across all grades and in both conditions:

Table Two

Use of names and other nouns in non-pronominal referring expressions

	Names	Other nouns
Above-average	8.84	4.01
Below-average	10.80	1.69

Taken together, then, these analyses suggest that below-average writers are doubly disadvantaged in their production of non-pronominal anaphoric reference: On the one hand, they are less likely to name their characters and, perhaps as a result, are less likely to adopt the (simpler) strategy of using character names to make non-pronominal anaphoric reference. At the same time, they seem to lack knowledge of how alternative wordings (such as the other boy or another one)

function, at least in the contexts required by our stories.

In addition to the experimental cartoon-elicited texts, children also produced stories in response to a simple story-starter, spoken by the research assistant: "Two people met on a dark street one night. Write a story about what happened." These texts provide some control for the effects of cartoon-elicitation procedures and provide additional information about children's referential strategies in situations which more closely approximate those of the normal classroom story-writing assignment.

Analyses of ambiguities in these texts show that, once again, below-average writers produce more ambiguity. Moreover, as can be seen in Table Three, the effect of skill level now interacts with grade: as above-average writers get older (and presumably have more experience with writing), the amount of arbiguity in their texts decreases while for below-average writers, the amount increases . In contrast to the cartoon story data, however, there were no differences in the type of ambiguities produced by children in the two skill groups nor were pronouns as prominant: in both groups, nouns accounted for two-thirds of the ambiguities produced. Moreover, analyses revealed no reliable differences in the type of language used in children's referring expressions. Children in both skill groups used pronouns more frequently than nouns but followed the adult pattern of using nouns in situations where a change in thematic focus is intended.

Table Three

Mean number of ambiguities in story-starter texts

	Below-average	Above-average
Fifth grade	.841	.588
Sixth grade	1.833	.030
Seventh grade	1.199	.078

We had expected that differences in amount of ambiguity produced by the two groups might have been partly accounted for by differences in narrative strategy. For example, we had hypothesized that below-average writers would

be more likely to tell stories about two same-gender characters, thus creating for themselves more difficult referential contexts. However, this did not turn out to be the case: about half the writers in each group produced such stories and, if anything, below-average writers produced slightly fewer than their above-average classmates. But as might be expected (given the results obtained for the experimental texts), more of the below-average writers' ambiguities occured in texts with same-gender main characters than in texts where character gender differed.

Data from the experimental texts led us to expect that below-average writers would also be less likely to name their characters, but again, there was no difference in amount of character naming in the two groups. Indeed, unlike the cartoon-generated texts, named characters were relatively rare and as a result, names were used less often than other nouns in the non-pronominal referring expressions of all children. This lack of naming may have had little effect on the referencing of above-average writers, since data from the experimental texts indicate that these writers have a good grasp of how alternative noun phrases work (e.g., those involving such distinguishing words as the other or another). For below-average writers, however, the increased use of non-name noun phrases may have served to increase the amount of ambiguity in their texts since (as data from the experimental texts show) below-average writers had difficulty using many of these distinguishing words unambiguously.

Implications for Writing Instruction

While it is clear that writers in this age range have developed a number of basic strategies for achieving text coherence, it is also evident that below-average writers have difficulty adapting these to the needs of more challenging or unusual contexts. In particular, they had difficulty accomplishing unambiguous referencing in situations where several same-age, same-gender referents were to be distinguished. Several problems seemed to be involved. For one thing, the fact that these writers persisted in using pronouns suggests that they

may have had little understanding of the effects of these contexts on pronoun use. In many cases, nouns (and particularly character names) would have been preferable, but unfortunately, other problems made it difficult for below-average writers to make effective use of these alternatives. For one thing, below-average writers often failed to provide names for their characters. At the same time, they seemed to have a poor understanding of how other types of distinguishing noun phrases (e.g., the other boy, another girl, etc.) might work

These results suggest that below-average writers might benefit from two sorts of activities. On the one hand, they probably need many opportunities to construct referencing in some of these more challenging contexts in situations where they have an opportunity to observe and discuss the effects of various word choices on readers' expectations and interpretations. The goal of such instruction would be to help children appreciate and articulate the effects of context on the interpretability of various linguistic devices. At the same time, below-average writers should be encouraged to produce a more particularized narrative text which includes both character names and other distinguishing details. One step in this direction might be to encourage role play and other brain-storming activities prior to actual composition. However, in the beginning these writers may fail to incorporate the information generated in brain-storming sessions in their compositions and may need considerable practice before the transfer of information from one situation to the other becomes assured.

Section Three: Children's revisions of ambiguous pronouns and nouns

Although much of our research focused on children's production of referring expressions, we were also concerned with children's evaluation and revision of referring expressions in their own texts and the texts of others. The problem was addressed in a series of studies described in Bartlett, 1982, (reproduced in Appendix D) and in Bartlett, 1981, Chapter 3 (reproduced in Appendix E). These studies and their results are summarized as follows:

Experiment 1

In the first study, we investigated fifth, sixth and seventh grade above- and below-average writers' skill in detecting and correcting ambiguous nouns and pronouns in short narrative paragraphs adapted from the texts of other elementary age writers. The subjects for this study were those children who participated in our study of text production (See Section Two and Appendix C). In all 116 children in eleven public school classrooms participated. Included were 39 fifth graders (19 below-average and 20 above-average writers); 40 sixth graders (20 below- and 20 above-average writers) and 37 seventh graders (17 below- and 20 above-average writers). Current writing skill was assessed by asking classroom teachers to rate each student as being above-average, average or below-average in current writing achievement, using the "same criteria that you use when you assess children's achivement for report cards."[1] To insure that children were at least roughly comparable in other literacy skills, we included in our sample only children who were reading on grade level or above, as indicated by each child's most recent standardized test score.[2]

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[1] It would no doubt have been preferable to have used some standardized writing achievement test, but we were unable to find an appropriate one. Moreover, as children's writing is customarily assessed by teacher evaluation in these schools, the present method seemed like a valid way of establishing samples of good and poor writers.

[2] In many cases, below-average writers turned out to be below-grade readers. Since we wished to unconfound reading and writing difficulties (insofar as that was possible), these writers were not included in our sample. Difficulty in finding below-average writers who were reading on grade level thus accounts for the disparity in numbers of below- and above-average subjects in the fifth and seventh grade samples. (See discussion, Section Four)

The materials, which are reproduced in Appendix F, consisted of eight short texts: three containing a single ambiguous pronoun; three containing two ambiguous referring expressions, a noun and a pronoun; and two containing a missing subject or predicate. Here are some examples:

> Single pronoun text: Policemen sometimes have special jobs. Once there was a policeman who was supposed to chase robbers. One day he got into a policecar and drove to the city to catch a robber. They had a big fight. He was killed.
>
> Noun & pronoun text: One day a man left his house. Another man was standing outside. The man took out a letter and gave it to him. They talked for a while and then they got into a car. They were both policemen. They were going to catch a thief.
>
> Missing subject: A man was going to the movies. Later was going to meet his wife. They were going to have a Chinese dinner and then take the subway home. But when the man got to the movies he saw he had no money. He had left it at home.

The revision task was administered by a research assistant in children's classrooms as whole-group activities. Children were given a brief warm-up revision task in which they were asked to correct a three sentence paragraph which the research assistant wrote on the board. The sentence problems included number disagreement and inappropriate tense markers. Task booklets were then distributed and children were allowed up to thirty-five minutes to complete the task.

Two aspects of children's revision skills were assessed: skill at detecting ambiguity and skill at correcting it. Children were judged to have detected an ambiguity if they changed any portion of the ambiguous wording, regardless of whether the change eliminated the ambiguity. For example, if a child changed the noun & pronoun text presented above to:

> One day a man left his house. Another man was standing outside. The man took out a letter and gave it to the other man...

that child was credited with detection, despite the fact that the ambiguity was not corrected. Children were judged to have corrected an ambiguity if two coders (working independently) judged the resulting text to be no longer ambiguous.

Results

Because there were fewer missing subject/predicate problems than pronoun or noun/pronoun problems, the missing subject/predicate problems were analyzed separately. A two-way analysis of variance (grade x skill level) of the subject/predicate detection data reveals a main effect for skill level ($F=7.05314$; $df=2,110$, $p=.009$), with above-average writers detecting more problems than their below-average classmates ($\bar{X}$ above=1.817; $\bar{X}$ below=1.254). Correction data show essentially the same pattern. Moreover, the mean number of corrected texts was virtually identical to the mean number of detected texts in each skill group ($\bar{X}$ above= 1.792; $\bar{X}$ below = 1.132), indicating that if children could detect a problem, they were able to correct it. As we shall see, this was not the case with the referential ambiguities.

A three-way analysis of variance of the ambiguity detection data (grade x skill level x task (pronoun vs. noun/pronoun)) revealed a main effect for level ($F=6.62289$; $df=1,110$; $p=.011$) and a task x level interaction ($F=6.91783$; $df=1,110$; $p=.01$). Overall, above-average writers detected more ambiguities than their below-average classmates ($\bar{X}$ above= 1.942; $\bar{X}$ below=1.636), but the effect interacted with task:

	Mean number ambiguities detected	
Type of problem	below-average	above-average
pronoun	1.749	1.812
noun/pronoun	1.523	2.083

As can be seen, below-average writers performed a little worse on the noun/pronoun problems than on the pronoun problems while the above-average writers performed a little better. But on the whole, children were about as likely to detect one type of ambiguity as the other (i.e., there was no main effect for task). Children did not, however, find these problems equally easy to correct. A three-way analysis of variance of correction data (grade x skill level x task (pronoun vs. noun/pronoun)) revealed main effects for grade ($F=5.669$; $df=2,110$; $p=.006$), skill level

(F=10.309; df=1,110; p=.002) and task (F=85.227; df=1,110; p=.000). As children got older, they got better at correcting these ambiguities ($\bar{X}$ fifth grade=1.09145; $\bar{X}$ sixth grade= 1.25625; $\bar{X}$ seventh grade = 1.403675). Moreover, at each grade level, above-average writers performed better than their below-average classmates ($\bar{X}$ above-average=1.404166; $\bar{X}$ below-average = .903766). Additionally, pronoun problems were more than twice as likely to be corrected as noun/pronoun problems ($\bar{X}$ pronoun=1.67672; $\bar{X}$ noun/pronoun=.64224). Comparison of the detection and correction data indicate that while children were able to correct almost as many pronoun problems as were detected ($\bar{X}$ detect pronoun= 1.77; $\bar{X}$ correct pronoun=1.676), children were able to correct less than half as many of the noun/pronoun problems as were detected ($\bar{X}$ detect noun/pronoun=1.80; $\bar{X}$ correct noun/pronoun= .642).

A detailed discussion of children's correction strategies is presented in Appendix D, pages D356-D360, and will not be repeated here. Suffice to say that when children corrected the pronoun problems, they invariably did so by substituting a noun from the text for the ambiguous pronoun. For example:

> Single pronoun text:...One day he got into a policecar and drove to the city to catch a robber. They had a big fight. He was killed.
>
> Typical solution: ...They had a big fight. The robber was killed.

For the noun/pronoun problems, however, such a solution was not possible since the text contained no noun or noun phrase which would adequately serve to differentiate between the two ambiguous forms:

> Noun/pronoun text: One day a man left his house. Another man was standing outside. The man took out a letter and gave it to him...

To correct the ambiguities, writers must either add information (e.g., descriptive information: One day a tall man left his house. Another man was standing outside. The tall man took out a letter and gave it to him.) or name the characters or solve the problem by maintaining an indefinite reference throughout the text (e.g., One man took out a letter and gave it to the other.). (Children could also solve the problem by deleting the ambiguity altogether, but none did.)

In the majority of cases, when children solved these noun/pronoun problems, they did so by inserting new information about character names or character attributes.

No doubt children's difficulties with the noun/pronoun problems are related to a number of factors, including the mechanics of physically inserting new material into text. But one problem may have proved overwhelming: the task of generating new disambiguating information about one or both or the noun phrases. This aspect of the problem was explored in Experiment 2, which compared children's solutions to noun/pronoun problems when the text included potentially disambiguating information and when children must supply that information themselves.

Experiment 2

Subjects: Thirty-nine children participated: twenty sixth grades (10 judged by their teachers to be above-average and 10, below-average in current writing skill) and nineteen seventh graders (10 above-average and 19 below-average in current writing skill). As in Experiment 1, all children were reading on grade level or above.

Materials: Children were asked to revise six texts: the three noun/pronoun texts administered in Experiment 1 which provided no potentially disambiguating information about the referents of the two ambiguous noun phrases; and three new noun/pronoun texts which did provide differentiating information in the form of character names. (All materials are reproduced in Appendix F)
Here is an example of a new noun/pronoun text with differentiating information:

> Noun/pronoun text with names: A girl named Linda lived on State Street. Another girl named Jane lived next door. The girl had a new sled and wouldn't let her ride it. They argued about it for a long time. Finally, they agreed to share the sled. After that they became best friends.

Procedures: Procedures were identical to those of Experiment 1: The task was administered as a whole-class activity and took about thirty minutes. It was preceded by a brief warm-up revision activity.

As in Experiment 1, two types of data were analyzed: children's detections of ambiguity and their corrections. Procedures for scoring children's responses with respect to detection and correction were identical to those in Experiment 1.

Results

A three-way analysis of variance of the detection data (grade x skill level x task (no-name vs. name texts) reveals only a main effect for grade ($F=6.99666$, $df=1,35$; $p=.014$) and no interactions. Overall, seventh graders performed significantly better on both types of tasks ($\bar{X}$ sixth per task = 1.075; $\bar{X}$ seventh per task = 2.0028). Analysis of the correction data, however, reveals not only a main effect for grade ($F=10.88758$; $df=1,35$; $p=.002$) but also a main effect for task ($F=16.38912$; $df=1,35$; $p<.001$) As might be expected, seventh graders were able to correct more problems per task than sixth graders ($\bar{X}$ sixth=.65; $\bar{X}$ seventh = 1.742);but in addition,for all children, the no-name texts were more difficult to correct than texts in which names were provided ($\bar{X}$ no-name = .87179; $\bar{X}$ name = 1.48718). The point, then, is that while these children were able to recognize and use disambiguating information when it was provided in a text, they had considerable difficulty generating the same type of disambiguating information on their own. The difficulty is all the more striking when we realize that children worked on both types of problems in a single session and might have adopted our use of named characters as a model for solving referential problems in the texts without character names. That so few children did this suggests that the tasks of generating and recognizing disambiguating information may draw on rather different sets of skills.

Experiment 3

A third study investigated children's ability to detect and correct referential ambiguities and missing elements (particularly subjects and predicates) in their own texts and in texts presented by the experimenter. The data come from a total of 110 fourth and fifth graders drawn from five public school classrooms. The data are described in detail in Bartlett, 1982 (Appendix D) and will only be briefly summarized here.

To motivate children's revisions, children were told that they would write a story for publication in an anthology to be distributed to children in all of the participating classes in the school. Stories were then elicited in response to our standard story starter: "Two people meet on a dark street one night. Write a story about what happened." Copies of children's texts were then xeroxed for use in subsequent analyses and originals were returned to the children for editing prior to publication. Editing occured one to two weeks after composition.

Prior to editing, children were instructed to reread their stories "to make sure that your story really says what you want it to say" and then told to "make any changes that will make your story better." Children were explicitly told not to worry about spelling and punctuation since we would take care of that when we had the stories typed up for the anthology.

One week after editing their own texts, children were asked to edit the set of eight short narrative paragraphs presented in Experiment 1. Procedures were identical to those described in Experiment 1.

Results

In analyzing the data, we were primarily interested in comparing children's detection of referential ambiguities and missing subjects and predicates in their own texts and in the experimental texts. As a first step, each first draft was examined by two trained raters, working independently, for instances of referential ambiguity or a missing sentence element. In the fifth grade corpus, raters found a total of 34 texts with at least one instance of a syntactic anomaly and 30 with some referential ambiguity (representing 49% and 43% of the total number of texts, respectively). In the fourth grade corpus, raters identified 16 texts with at least one instance of syntactic anomaly and 18 with some referential ambiguity (52% and 58% of the total texts, respectively). A student was given credit for detecting a text problem if both raters agreed that anomalous or ambiguous portions of the text had been

altered during revision, regardless of whether the writer succeeded in correcting the problem.

We had predicted that children would be more likely to detect syntactic anomalies than referential ambiguities in their own texts and this was strikingly confirmed. Of the 34 fifth graders producing syntactic anomalies, 18 (53%) managed to detect at least one anomaly during revision. By contrast, of the 30 students producing referential ambiguity, only 5 (17%) managed to detect the problem. The difference between these percentages is statistically reliable ($z=3.00$; $p < .01$) Similar percentages occur in the fourth grade sample, with 44% of the 16 children producing syntactic anomalies detecting them and only one child detecting a referential ambiguity.

The results are quite different from those obtained on the experimental texts. Here, we found that of the 30 fifth graders making referential ambiguities, 22 (73%) detected at least one referential ambiguity in these texts and in all managed to detect 57% of the total number of problems presented. Similar results were obtained from the 34 fifth graders producing syntactic anomalies: 30 (88%) managed to detect at least one anomaly in the experimental texts and over all, they managed to detect a total of 69% of these problems. Although the syntactic anomalies were somewhat easier to detect, the difference in the percentage of detected problems was not statistically reliable ($z=1.71$; $p > .05$). Skills of the fourth graders were less advanced, with only 10 children (63%) detecting at least one anomaly in the experinemtal texts and 6 children (33%) detecting at least one referential ambiguity.

Taken together, these results indicate that for children in this age range, both types of text problems are substantially easier to detect in the texts of others than in their own. Nor does the difference seem due to any reluctance on the part of these young writers to make changes in their first drafts. Of the fifth graders producing referential ambiguity, 57% makde some text change during revision whereas 53% of those making syntactic anomalies did so.

These percentages are comparable to the 61% found for the sample as a whole. (Fourth graders were a little less likely to make changes: 49% of those producing a target text problem made some change, as compared with 56% for the sample as a whole.)

Implications for Instruction and Assessment

1. The results of Experiments 1 and 2 indicate that while above-average writers are better at detecting and correcting referential ambiguity and syntactic anomaly, all children were able to detect problems which they were unable to correct. Moreover, at all skill levels, children were better at correcting some problems than others. In particular, children were better able to correct ambiguities in situations where they need only substitute for the ambiguity some wording already present in the text (as was the case with the pronoun problems) than they were in situations where ambiguity could be corrected only by adding new information to the text (as was the case with the noun/pronoun problems). This suggests that upper elementary age children would benefit from practice revising ambiguous referencing in some of these more challenging contexts. Moreover, the data suggest that children may benefit from instruction which enables them to compare the results of alternate referencing strategies (i.e., simple rewordings vs. introduction of new information), both with respect ot the resulting improvement in referential coherence and the kinds of changes that must be made in the surrounding text to accomodate the addition of new material.

2. As the results of Experiment 3 indicate, skill in detecting problems in the writings of others need not be accompanied by skill in detecting similar problems in ones own. This suggests that practice in the one situation may not necessarily lead to skill in the other. Initially, it may be easier for students to perceive ambiguities and other kinds of problems in the texts of others and this may therefore be a good place for instruction to begin. However,

given the discussion in Bartlett, 1982, it is likely that editing in the two situations may draw on somewhat different cognitive skills, which means that students may need help in adapting what they learn in the one situation to the requirements of the other.

3. Results of Experiment 3 also have serious implications for writing assessment. Although the situation is changing, many standardized tests still attempt to assess students' writing by assessing students' skill in revising assorted tester-prepared texts, presumably on the assumption that revision provides a reasonable estimate of writing skill and revision of another's text, a reasonable estimate of skill in revising one's own. Disregarding the validity of the first assumption for the moment, our data suggest that the second is probably ill-founded. Given the results of Experiment 3, it is likely that revision of tester-prepared texts may seriously underestimate students' difficulties in handling ambiguity and syntactic anomaly, at least in the upper elementary and junior high school years.

Section Four: Methodological Issues

1. Sample Selection and the Resulting Corpus of Written Narratives

In our original proposal, we proposed to study narratives of good and poor writers in grades three through eight. Writing skill was to be determined by teacher evaluation: Teachers were to rate each child in each class as being below-average, average or above-average in current writing achievement, using the criteria "that you use when you assess children's achievement for report cards." Additionally, because we wished to insure that children were roughly comparable in other literacy skills, we stipulated that all children in the study be reading on grade level or above.

Unfortunately, we were unable to find subjects meeting these criteria at some grade levels. In third, fourth and eighth grades, we could find only a handful of children who were judged to be poor writers but who read on grade level. (Indeed, it was only at the sixth grade level that we were able to obtain all 20 below-average writers stipulated by our research design.) Moreover, although our goal was to obtain samples that were equivalent in reading level, the reading level of above-average writers was significantly higher (sometimes by as much as two grade levels) than below-average writers at every grade level. It appears, then, that in this age range, writing and reading skills are highly correlated.

All children whose data are included in the study of referring expressions (Section Two, Appendix C) wrote three stories and participated in one editing task. In all, this sample includes 116 children. But because we worked with intact classrooms, data were also collected from 703 children not included in our experimental sample. While referring expressions in these papers have not been analyzed, other aspects of these narratives are currently being studied as part of a study of the development of narrative rhetoric. In all, the corpus consists of 1330 stories collected from children in 22 public school

classrooms:

grade	number of classrooms	number of children
3	4	117
4	4	123
5	5	157
6	3	102
7	3	108
8	3	96

Additional editing data were obtained from 203 children in five sixth and three seventh grade classrooms.

Originally, we had planned to obtain stories from college-age adults as well, but when we tried, many complained that that the stimuli were unsuitable. Since it was important to obtain writings that were elicited by the same stimuli as had been used with the children (and since we were unable to find a way of motivating college-age adults to produce narratives in response to these stimuli) we decided to forego this aspect of the research. In contrast, adults did not complain about the editing tasks and appropriate editing data from 20 graduate-student subjects were collected.(See Appendix D, page D358)

2. Effects of stimulus materials on output

Narratives for our research were elicited by two types of stimuli:

a) Children wrote in response to the following story starter which was spoken by the research assistant: "Two people met on a dark street one night. Write a story about what happened."

b)Children also wrote about events pictured in two seven-panel cartoons reproduced in Appendix G.

In this section of the report we will describe effects of these two types of stimuli on story length, syntactic complexity (as measured by t-unit length), and amount of referential ambiguity . Data come from 116 fifth, sixth and seventh grade subjects who participated in the study of referring expressions (Section Two and Appendix C).

Story length: Number of words per story was assessed by a three-way repeated measures analysis of variance, with grade and skill level as between-subjects factors and task as a repeated, within-subject factor. The analysis revealed large main effects for each factor and no interactions: F grade=39.134, df=2,110; $p < .001$; F skill level =22.204, df=1,110; $p < .001$; F task=36.032; df=2,220; $p < .001$. Older subjects produced longer stories ($\bar{X}$ 5th graders=114.47 words; $\bar{X}$ 6th graders = 174.29 words; $\bar{X}$ 7th graders = 233.81 words) and at each grade, more skilled writers produced longer stories than their less skilled classmates ($\bar{X}$ below-average writers = 151.22 words; $\bar{X}$ above-average writers = 200.49). With respect to elicitation conditions, story-starter narratives were longer than cartoon narratives at all grade and skill levels, and cartoon stories did not differ appreciably between themselves ($\bar{X}$ story-starter texts= 207.198; $\bar{X}$ easy-context cartoon texts = 159.181; $\bar{X}$ difficult-context cartoon texts = 161.353).

Length of t-unit: Number of words per t-unit was assessed by a three-way repeated measures analysis of variance, with grade and skill level as between-subjects factors and task as a repeated, within-subject factor. Although there were main effects for grade and skill level, there were no task effects and no interactions. Similar results were obtained when we compared the ratio of clause to t-unit in these texts.

Amount of referential ambiguity: A comparison of amount of referential ambiguity elicited by story-starter and cartoon stimuli presents a number of difficulties, since the two cartoons were designed to present writers with referential tasks of varying complexity. The effects of these two cartoon conditions on referential coherence have been described at length in Section Two and Appendix C. What we wish to consider here are the effects on referential

coherence of writing under two very different sets of constraints: 1) in situations where writers must invent an event structure (or plot) as well as a wording for their texts; and 2) in situations where an event structure is provided in picture form. Given this purpose as well as the somewhat special (and more difficult) nature of the difficult-context cartoons, it seems reasonable to address the question of stimulus type by comparing ambiguities in the story-starter (or baseline) and easy-context cartoon conditions. The data come from analyses of referential ambiguities as described in Appendix C. A three-way analysis of co-variance (grade x skill level x task (story-starter vs. easy-context cartoon), with number of words per story as co-variate), revealed a main effect for skill level ($F=4.787$; $df=1,109$; $p=.03$) as well as task x level ($F=7.644$; $df=1,109$; $p=.007$) and grade x level ($F=4.013$; $df= 2,109$; $p =.021$) interactions, illustrated in Table One and Table Two.

Table One
Mean number of referential ambiguities in story-starter and easy-context cartoon texts of above- and below-average writers

	Texts	
Subjects	Story-starter	Cartoon
Above-average	.233	.50
Below-average	1.291	.53

Table Two
Mean number of referential ambiguities in story-starter and easy-context cartoon texts of fifth, sixth and seventh graders

	Texts	
Subjects	Story-starter	Cartoon
Fifth graders	.72	.51
Sixth graders	.93	.31
Seventh graders	.64	.74

As can be seen in Table One, story-starter and cartoon conditions had different effects on the amount of referential ambiguity produced by above- and below-average writers: While the story-starter condition elicited almost twice as much ambiguity from the below-average writers as from their above-average classmates, the easy-context cartoon condition resulted in an equal amount of ambiguity. That is, in the cartoon condition, the amount of referential ambiguity in below-average writers' texts decreased relative to that observed in the story-starter condition while for above-average writers, the amount of ambiguity increased. Additionally, for reasons that remain unclear, data in Table Two show that sixth graders as a whole produced less ambiguity in the easy-context ccartoon condition and more ambiguity in the story-starter condition than children in other grades.

Implications for Writing Instruction and Assessment

1. Provision of a pictured event structure had very different effects on the referential coherence of above- and below-average writers' texts, increasing the amount of referential ambiguity (relative to that obtained in the story-starter condition) for above-average writers and decreasing it for below-average writers. For below-average writers, this indicates some difficulty in inventing a consistent event structure and suggests that some of the ambiguities observed in the wordings of their story-starter texts may have been due to faulty organization of the narrative content. This notion is supported by analyses of the type of ambiguity found in children's story-starter (or baseline) stories (but not in their cartoon stories) as reported in Appendix C.

In brief, many of the ambiguous nouns observed in children's story-starter texts resulted from a faulty introduction of information: that is, situations in which writers alluded to information which, in fact, had not been made available to readers. For example, writers might make definite reference in situations where the presence of the intended referent cannot be readily inferred. Or writers might refer to a character's attribute without first telling a reader of the

attribute's existence. Presence of these problems suggests that below-average writers may need practice comparing the kinds of inferences that readers are able to make in a given context with the kinds of inferences required by various referring expressions in that context. Additional practice evaluating the effects on coherence and on reader's expectations of alternative wordings and various changes in the information conveyed by the context may also prove useful.

With respect to above-average writers, the data are somewhat difficult to interpret since it is unclear why the provision of a pictured event structure should lead to an increased amount of referential ambiguity relative to that observed in these children's story-starter texts. The increase may, in fact, be somewhat artifactual, due to the extremely low amount of ambiguity in the sixth and seventh graders' story-starter texts.

2. With respect to writing assessment, two aspects of these results deserve mention. First, the data indicate that in this age range, both above- and below-average writers are likely to write longer stories if given a simple story-starter without a constraining event structure. This suggests that in situations where amount of output is paramount, the use of story-starters is to be preferred. However, as noted above, story-starters and cartoons had different effects on the amount of referential ambiguity produced by children in the two groups. This suggests that in situations where it is important to measure referential coherence, it may be preferable to provide some control over referential context by controlling event structure (e.g., through the use of cartoon elicitation conditions). Conversely, it should be noted that these elicitation conditions had little effect on syntactic complexity (as measured by length of t-unit and ratio of clause to t-unit), suggesting that in situations where it is important to measure syntactic complexity, either condition would be appropriate.

Dissemination

Publications

Hirst, W., Levine, E. M. & Henry, S. A discourse function of anaphoric pronouns. Submitted

Hirst, W., & Brill, G.A. Contextual aspects of pronoun assignment. Journal of Verbal Learning and Verbal Behavior, 1980, 19, 168-175.

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Papers and talks

In 1979 and 1980, Bartlett presented talks about the development of children's referencing skills at the following meetings:

New York Child Language Association

New England Child Language Association

New York Orton Society

Society for Research in Child Development

Canadian Council of Teachers of English

Other

1. Results of Bartlett's studies of referring expressions have been presented informally as part of Bartlett's on-going participation in the development of items for the 1983 National Assessment of Educational Progress in Writing.

2. Bartlett has shared results of her research with all teachers whose classes participated in the study and with other personnel in the participating New York City Public Schools.

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Appendix A

A Discourse Function of Anaphoric Pronouns

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Running Head: Function of Anaphoric Pronouns

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A Discourse Function of Anaphoric Pronouns

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Integration, function of pronouns

Memory, discourse

Syntactic processing, anaphora

Abstfact

Pronouns may signal integration whereas integration may be postponed if the pronoun is replaced by a repeated noun phrase. In Experiment 1, the gist of stories containing repeated noun phrases was not remembered as well as gist of stories with pronouns. Experiment 2 followed Jarvella (1971). Verbatim recall for recently heard pronominalized sentences was worse than verbatim recall for similar sentences employing repeated noun phrases. In Experiment 3, pronominalized sentences took less time to comprehend than did sentences beginning with repeated noun phrases. These findings suggest that a listener integrates information in a pronominalized clause with preceding text before s/he would if the pronoun were replaced by its antecedent.

A Discourse Function of Anaphoric Pronouns

Why does a writer or speaker frequently use a pronoun to tie together segments of discourse when the repetition of a noun phrase would do? Pronouns seem to place more processing demands on the listener than do repeated noun phrases. The evaluation of a candidate antecedent of a repeated noun phrase probably only requires a simple matching routine (Clark & Clark, 1977) whereas complex syntactic, lexical, and pragmatic restrictions would have to be built into any mechanism that would successfully evaluate candidate antecedents of a pronoun (Hirst & Brill, 1980; Springston, Note 2). Why would a writer or speaker employ an anaphoric device that places added burdens on the listener or reader when a much simpler device is available?

Obviously, an anaphoric pronoun may be used in preference to a repeated noun phrase for stylistic variation, but a deeper explanation is possible. Non-pronominalized noun phrases can introduce new characters, events, ideas, or objects as well as serve an anaphoric function, but pronouns, at least non-deictic personal pronouns, can only act anaphorically. Pronouns, unlike repeated noun phrases, would unambiguously signal a listener or reader to integrate information in the pronominalized clause with information in the preceding discourse. Pronouns then serve a distinct discourse function. When a listener or reader encounters a pronoun, he begins

to integrate the information in the pronominalized clause with the information contained in the preceding discourse; when he encounters a non-pronominalized noun phrase, he holds off integration until he can determine with certainty whether the noun phrase introduces a new character or refers to an old one. As a result, pronouns actually facilitate integration.

Lesgold (1972) is often cited as support for this hypothesis. Lesgold, however, did not examine two different forms of anaphora, but tested subjects' memory for sentences with or without coreferential ties. For example, Lesgold asked subjects to remember sentences like The aunt ate the pie and she was senile vs. The aunt ate the pie and Alice was senile, whereas the proper comparison for the present question would be The aunt ate the pie and she was senile vs. The aunt ate the pie and the aunt was senile.

The first experiment tested whether pronouns facilitate integration. Paragraphs in which either pronouns or repeated noun phrases are used exclusively to refer to the main character were heard and later recalled. It was expected that the paragraphs with pronouns should be better remembered than the version with repeated noun phrases. The second experiment extended the results of Experiment 1 and examined the differential effect pronouns and repeated noun phrases have on short term memory of discourse. The third experiment investigated the effect pronouns have on comprehension speed.

Experiment 1

The first experiment attempts to establish in rather broad terms that pronouns facilitate integration. Although the details of the processes involved in integration have yet to be clearly established (see Clark & Clark, 1977), several means of measuring "ease of integration" have been proposed. One measure --gist recall — is suggested by the seminal work of Bransford and Johnson (1973), which showed that the easier text is to integrate the better a person can recall the ideas from the text. The motivation for this measure is clear if integration is thought of as the process by which connections between the propositional statements of a passage are constructed. Given the speed with which people talk or read, integration and comprehension work under time constraints. As a consequence, the number of connections that a person forms in a passage will depend on the ease with which the passage can be integrated. Since gist recall depends on how connected one idea from a piece of discourse is to another, it should also depend on ease of integration.

Experiment 1

Method

Subjects. Sixteen respondents to an advertisement in the Village Voice served as paid subjects. They were divided into two groups of eight.

Material. Six stories with an average length of 50 words and 6.7 clauses were written. Two stories had five idea units, two six, and two seven idea units. Each story centered around a single male actor and referred to him five times. The first sentence in each story introduced the actor and then the topic of the story.

Two judges were asked to divide the stories into "large idea units." When a discrepancy between the two judges arose, a compromise was reached. These pre-experimentally determined idea units were used in the recall analysis. One story, about going to the opera, is as follows. (The idea units are indicated by slashes.)

> Peter went to the opera./ It was the first opera of the season./ He had thought that tickets would be hard to come by,/ but he only had to order them a week in advance./ He was excited by what seemed sure to be a great performance/ and had read the libretto several times./ He also listened to all the recordings available.

Two versions of each story existed. The first sentence of both versions was the same. In the pronoun version, a pronoun was used in the remaining part of the story to refer to the actor; the example above is in the pronoun format. In the repeated noun phrase format, the pronoun was replaced by its antecedent.

The six stories were tape recorded at a rate of 2.5 words per second onto two tapes. Each tape contained all six stories, one five, one six, and one seven idea units per story in the pronoun format; the other three in the repeated noun phrase format. The stories in the pronoun format on one tape were in the repeated noun phrase format on the other. The order of the stories was random and did not differ on the two tapes.

Design and procedure. One group of subjects heard the first tape; the other the second tape. After they had listened to the

six stories, they spent ten minutes trying to solve a mathematical puzzle. They then had to recall the gist of the six stories. The experimenter cued each story with its topic. Thus, the example above was cued with "Tell me the story about going to the opera." The subjects wrote their response on a fresh piece of paper immediately after the cue. They were told that verbatim memory was not important. The cues were given so that subjects recalled a story that had appeared in the pronoun format after recalling a story that had appeared in the repeated noun phrase format, and vice versa. Half of each group began the recall sequence with a pronoun story; the other half with a repeated noun phrase story.

Results and Discussion

Two judges scored the recall protocols by counting the number of recalled idea units. Since their judgments strongly agreed (Pearson correlation, r = .98), the two scores were averaged. Subjects recalled an average of 49% of the idea units in the stories with repeated noun phrases and an average of 61% of the idea units in the stories with pronouns. Thus, subjects recalled the gist of the pronominalized stories better than the gist of the stories with repeated noun phrases (min F' (1,19) = 4.39, $p < .05$). The results indicate that pronouns do indeed facilitate integration. The next experiment goes a step further.

Experiment 2

Experiment 1 showed that pronouns facilitate integration, but the design was not sensitive enough to test the hypothesis that pronouns signal a listener or reader to begin integration. People only retain a verbatim representation of a sentence for a few seconds but remember the gist over the long term. A person encountering a repeated noun phrase should attempt to hold its verbatim representation in memory at least long enough to determine whether the noun phrase introduces a new character or refers back to an old one. This effort is not necessary for pronominalized clauses. They should lose their verbatim representation in memory more quickly than clauses with repeated noun phrases.

The running memory span paradigm developed by Jarvella (1971) may be sensitive enough to test this conjecture. In these experiments subjects listen to text and without warning are asked to recall the last two sentences that they heard. Jarvella found that people remember the last sentence very accurately, but their verbatim recall falls off for the penultimate sentence. In the present study, the penultimate sentence will contain either a pronoun or a repeated noun phrase. When a pronoun replaces a repeated noun, subjects should quickly lose the details but maintain the gist of the penultimate sentence. The details should be preserved when the penultimate sentence contains a repeated noun phrase.

Method

Subjects. The thirty-two subjects in this experiment had

responded to an advertisement in the Village Voice and received compensation for their efforts. Sixteen were in the pronoun group; the other sixteen in the repeated noun group.

Material. Thirty experimental stories were written in two formats and had an average of 64.4 words and 6.2 idea units per story. A "beep" was placed at periodic places in each story. The penultimate sentence before a beep contained a single clause with an average of 9.4 words. In the Pronoun format, the actor was specified by a pronoun, either he or she, whose antecedent served as the subject of the preceding sentence. In the Repeated Noun format, the pronoun was replaced by its antecedent. The sentence before the beep was expected to push the preceding sentence out of short term store; it never contained any reference to the antecedent of the crucial anaphor. An example of a test passage in the repeated noun format is

> On the way back from the lumberyard, Tom stopped to buy some bricks. Tom wanted to start on the barbecue pit as soon as possible. Perhaps he could finish it by Labor Day. Elaine was excited about all the work to be done. Planning things was something Elaine had always loved to do. It was almost like daydreaming.

The stimulus material was recorded on two tapes, one of which contained the thirty stories in the pronoun format; the other, the stories in the repeated noun format. The stories were read at a rate of 2.5 words per second.

Design and procedure. Material was presented with a Revox tape recorder. The pronoun group listened to the pronoun tape; the repeated noun group heard the repeated noun tape. The experimenter stopped the tape immediately after he/she heard a beep. Subjects were instructed to listen to the story and to write down the two sentences preceding the beep as soon as they heard the sound. Verbatim recall was stressed, and subjects were given a new sheet of paper with each new passage. In order to insure that subjects were listening to the entire passage, they were told to expect a comprehension test at the end of the experiment. This test, however, was never administered.

Results and discussion

The crucial comparison is between verbatim recall of the penultimate sentence in the pronoun and repeated noun format. For this reason, analysis was confined to the recall protocols of the second to the last sentence. Following Jarvella (1971), two verbatim recall scores were calculated. The first, called lexical similarity, tabulated the number of correctly recalled lexical items and was expressed in terms of the percentage of original items correctly recalled. The second scoring, called running memory, counted the number of words correctly recalled in succession, starting from the last word in the sentence. Again, the measure was expressed as a percentage of the original. In both cases, the tabulations did not include the experimental pronoun or repeated noun since it was expected that subjects would often falsely recall a pronoun for a repeated noun phrase and vice versa. The recalled word had to be

exactly the same as the original to be correct. The running memory measure is more sensitive than the lexcial similarity measure since it penalizes subjects for syntactical transformations, intrusions, and a multitude of ordering problems. In addition to these two measurements, the recalled penultimate sentence was graded as to whether it captured the gist of the original.

Table 1 contains the results. Subjects obviously had no troulbe remembering the gist of the second to the last sentence.

Insert Table 1 about here

However, their verbatim memory was better when the sentence was in the repeated noun format than the pronoun format. An analysis of variance that treats both subjects and sentence material as random effects found a significant difference between recall scores for both the lexical similarity measure (min F' (1,59) = 4.82, $p < .05$) and the running memory measure (min F' (1,58) = 5.03, $p < .05$). Whereas subjects often substituted pronoun for repeated noun, and vice versa, these errors could not have attributed to the difference since they did not figure in the tabulations. As for other aspects of the penultimate sentence, it is not clear what kind of systematic errors should be present, and none were observed. The results indicate that pronouns, in comparison to repeated noun phrases, not only facilitate integration but serve to initiate integration.

Experiment 3

If pronouns signal a reader to begin integration then their presence should decrease comprehension time. The ease with which

a sentence is comprehended reflects not only intersentential considerations, but also the speed with which the sentence can be integrated with preceding text (Haviland & Clark, 1974). Integratic would, of course, be difficult if the referent of a pronoun were unclear (Chang, 1980; Springston, Note 1; also Garrod & Sanford, 1977; McKoon & Ratcliff, 1980; Sanford & Garrod, 1980). But in cas in which the referent is easily specified, the format of the anapho may have a measurable effect on reaction time:

Experiment 3 examined comprehension time for sentences with either pronouns or repeated noun phrases. Clark and Sengul (1979) failed to find a difference when they compared comprehension time of sentences with pronouns or definite noun phrases. However, their experimental sentences may have contained ambiguous pronouns. Consider their example, where the last sentence is the experimental one:

> A broadloom rug in rose and purple colors covered the floor. Dim light from a small lamp cast shadows on the walls. In one corner of the room was an upholstered chair. It appeared to be an antique.

It in the experimental sentence could presumably refer to "the chair" "the lamp", or "the rug". This ambiguity may have increased comprehension time for the sentence and cancelled out any difference that might exist between the comprehension of pronominilized sentence and their counterparts with repeated noun phrases. In order to avoid this confounding in Experiment 3, the experimental sentences will contain only unambiguous pronouns.

Method

Subjects. Twelve Princeton undergraduates formed one group; fourteen formed the second group.

Material. The material was taken from the stories of Experiment 2. Each of the stories were revised so that the two actors in the stories were of different sex. The crucial noun or pronoun in the experimental stories always referred to one of these actors. Thus, she would unambiguously refer to the female actor; he to the male. There were two sets of eight stories with a total of forty experimental sentences. In each set, half of the sentential subjects were pronouns and half repeated noun phrases, with the appropriate counterbalancing across sets. The experiment was conducted using a PET microcomputer fitted with software timer accurate to one millisecond.

Procedure. Each subject group received a different set of stories. Sentences were presented on a CRT, one sentence at a time, and subjects were asked to read the sentence and press a large button when they had understood the sentence and integrated it with the preceding material. The next sentence appeared after the button was pushed. A ready sign was flashed on the screen for ten seconds between stories. Response time was measured from the presentation of the sentence to the button press.

Results

It took an average of 2017.8 milliseconds (S.D. = 289) to comprehend and integrate sentences with pronouns, 2212.7 milliseconds

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(S.D. = 469) for sentences with repeated noun phrases. Hence, it was easier to integrate pronominalized sentences than their counterparts with repeated noun phrases (min F' (1,63) = 4.93, $P < .05$).

One possible explanation for this difference is that the 194.9 millisecond difference between the two conditions could have occurred because personal pronoun have fewer letters and are more frequent than the proper nouns in the stories. In order to test this hypothesis, we selected 13 experimental sentences in which the proper noun was a two or three letters common first name -- such as Bill,Bob, Sue, and Ed -- and analyzed the data in the same manner as above. The results were similar to those of the full sample. It took an average of 1907.2 milliseconds (S.D. = 274) to comprehend and integrate sentences with pronouns, 2298.4 milliseconds (S.D. = 389) for sentences with repeated noun phrases. This difference was significant (min F' (1, 21) = 4.52, $P <$ .05). Sentences with pronoun are easier to comprehend than sentences with repeated noun phrases not because of a word familiarity or length, but because of the presence of the pronoun.

General Discussion

Pronouns unambiguously signal a listener or reader that the information contained in pronominalized clauses must be integrated with information introduced in preceding text. Since repeated noun phrases do not share this property, text is easier to integrate when pronouns are used in preference to repeated noun phrases.

Several objections to this conclusion are possible. First,

the results of Experiment 1, 2, and 3 could reflect a stylistic awkwardness often found in prose with repeated noun phrases. This objection may not be to the point, since the present work could be viewed as an attempt to specify one factor that contributes to good writing (Hirsch, 1977). Moreover, the style of the stories in Experiment 2 and 3, at least, did not differ markedly. We asked twenty subjects to rate the style of the stories in all three experiments on a scale from one to seven, half in the pronoun format, half in the repeated noun phrase format. The stories in Experiment 1 with repeated noun phrases were stylistically inferior to the same stories with pronouns, 3.7 as compared to 4.08 (using Wilcox on test, $\underline{T}$ (16) = 15, $p < .01$). On the other hand, the ratings for the pronoun and repeated noun versions of the stories used in Experiment 2 and 3 were about the same, 3.95 and 3.82, respectively ($\underline{T}$ (19) = 72, n.s.). Thus, whereas the result of Experiment 1 could reflect the stylistic shortcomings of the repeated noun format, the results of Experiment 2 and 3 did not.

Another objection is that treatment of pronominal coreference is too simplistic in the present framework. The stories were written so that the antecedent always preceded its pronoun. In carefully circumscribed circumstances, antecedents may follow their pronoun. A review of the linguistic literature would take the present discussion far afield (but see Rienhart, in press). Suffice it to say, antecedents follow non-reflexive pronouns only when the pronoun is

preceded by a subordinate conjunction such as after, while, and although. The nature of this constraint suggests a conjecture currently under investigation (Hirst & Kimmel, Note 1). That is, the normal function of pronouns may indeed be to signal integration, yet this function may be suspended when a pronominalized clause is marked with a subordinate conjunction.

Despite these consideration, the present work has a direct bearing on a general theory of integration. Clark(1978; Clark & Haviland, 1977) has proposed the bare outlines of a model, based on the given-new contract. At the core of this proposal is the distinction between given information -- information that the speaker believes the listener knows and accepts as true -- and new information -- information the speaker believes that the listener does not know. Integration occurs in three stages: A listener computes what is given and what is new in an utterance, searches memory for the antecedent of the given information, and then adds the new information to memory. Thus, for John got some beer out of the car. The beer was warm., on coming to the second sentence, the listener would first isolate the given from the new information. In this case, The beer was X is the given information and X=warm is the new information. Once the given information is separated from the new information, the listener would search his memory for the antecedent of the beer, and then add the new proposition to his memory.

The present work investigated aspects of a mechanism listeners use to isolates given from new information. The ease with which a separation is accomplished will have a direct effect on processing. The less time incoming speech must remain in working memory, the

easier it is for a listener to accomplish other processing demands. Information, however, can only be transferred from short term to long term memory after the antecedent of the given information is found, and to go one step deeper, the antecedent can be found only after "given" is isolated from "new". Thus, it is to the advantage of a listener to make the separation as soon as possible.

The present research makes clear that markers exist in natural language to facilitate the process of distinguishing given from new information. Pronouns are probably just one example. The verb do and definite articles may be others. Comprehension can probably proceed without integration markers; but little words like he may lighten the processing demands placed on a hard pressed listener or reader bombarded at a rate of 150 or more words a minute.

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Footnote

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Table 1

Averaged Recall Scores on Three Measures for Penultimate Sentences With Pronouns or Repeated Nouns[a]

Measure	Pronouns	Repeated Nouns
Lexical Similarity	.78 (.08)	.88 (.08)
Running Memory	.52 (.12)	.70 (.17)
Gist	.95 (.02)	.96 (.03)

[a]Standard deviations in parentheses

Appendix B

Contextual Aspects of Pronoun Assignment

William Hirst and Gary A. Brill

Comprehension, anaphora
Integration, function of pronouns
Pragmatics, pronoun assignment

This article appears in Journal of Verbal Learning and Verbal Behavior, 1980, 19, 168-175.

Abstract

The effect of contextual constraints on pronoun assignment was explored for sentences with ambiguous and unambiguous pronouns. A preliminary experiment evaluated the contextual constraints affecting coreference in the experimental sentences of Experiment 1 and 2. by obtaining plausibility ratings. Experiment 1, using these ratings, showed that context affects assignment time in cases of ambiguous coreference. Experiment 2 extended the result to syntactically constrained coreference. It was concluded that integration must occur during rather than following assignment and suggested that pronouns act as indicators to integrate text.

Contextual Aspects of Pronoun Assignment

Pronoun assignment is a complex process which involves syntactic, semantic, and pragmatic considerations. Recent work on assignment has investigated syntactic and lexical aspects (Caramazza, Grober, Garvey and Yates,1977; Clark and Clark, 1977; Clark and Sengul,1979; Garvey, Caramzza, and Yates,1974-75;Grober, Beadsley and Caramazza, 1978; Langacker,1969; Partee,1975; Reinhart, Note 1; Springston,Note 2). To date, little work has been done on pragmatic aspects of pronoun assignment, although Clark and Haviland (1977) have investigated the effect of context on the comprehension time of sentences involving other forms of anaphora (but see Stenning, 1978). The present paper investigates the effect context has on pronoun assignment for sentences in which the contextual constraints are carefully controlled.

Various studies have suggested that assignment time could be affected by the distance between a pronoun and its antecedent and the semantic features of the verb (Caramazza etal, 1977; Clark and Sengul,1979; Garvey etal, 1974-75; Grober etal, 1978; Springston, Note 2). Obviously, contextual constraints also affect assignment. The referent of the pronoun in (1) is clear whereas

(1) John stood watching while Henry fell down some stairs.
He ran for a doctor.

(2) John stood watching while Henry fell down some stairs.
He thought of the future.

the referent in (2) is not. The difference between (1) and (2) is in the strengths of the contextual constraints; the stronger the context-

ual constraints the easier the assignment. In order to determine the pronominal referent, however, a person must integrate the information in the first sentence of (1) or (2) with the second. This process is similar to bridging (Clark and Haviland,1977).

The first experiment in this study verified that people do indeed integrate information before assigning a referent in sentences like (1). A preliminary experiment accessed the contextual constraints of the sentence pairs in Experiment 1. A finding that assignment time does vary with context, as measured by the preliminary experiment, would lend validity to this measurement. It would also empirically substantiate the intuitive hypothesis that for sentences like (1) and (2) people integrate information while they assign a referent to a pronoun. The second experiment in this study uses this measure to address a deeper question, that is, Do contextual constraints also affect pronoun assignment when the coreference is syntactically constrained? The question is an important one since none of the current models of assignment offer any guidance on what form an answer would take.

Preliminary Experiment

Subjects in this experiment rated the plausibility of sentences such as (3) through (6). A measure of contextual constraints for sentence pairs like (1) and (2) was extracted from these plausibility ratings by calculating a plausibility difference. The rating for

(3) If John had stood watching an accident, he might have run for a doctor.

(4) If John had stood watching an accident, he might have thought of the future.

(5) If Henry had fallen down some stairs, he might have run for a doctor.

(6) If Henry had fallen down some stairs, he might have thought of the future.

(5) was subtracted from the rating for (3) to obtain the plausibility difference for (1). Similarly, the rating for (6) was subtracted from the rating for (4) to obtain the plausibility difference for (2).

The results of this experiment were used in Experiment 1.

Method

Twenty-five subjects, volunteers solicited from a graduate course at the New School for Social Research, rated the plausibility of eighty sentences. They received a mimeographed list of these sentences, with a sequence of integers from one to seven appearing below each sentence, and were instructed to "rate (by circling the relevant integer) the plausibility or likelihood of each sentence on the scale of 1-7, with 7 being most likely or plausible, 1 being unlikely or implausible, and 4 being plausible or likely."

The material for this experiment was constructed with Experiment 1 in mind. In Experiment 1, the material has the form: John Xed while Henry Yed. He Zed. Subjects in this experiment rated the plausibility of sentences of the form: If John had Xed, he might have Zed, and If Henry had Yed, he might have Zed. The plausibility difference could then be obtained by subtracting the

average plausibility rating of If John had Xed, he might have Zed from the average plausibility rating of If Henry had Yed, he might have Zed.

In order to assure a wide range of plausibility differences in Experiment 1, the 80 test sentences in the preliminary experiment fell into eight sets of five pairs. The sets were selected with the expectation that one pair would yield a large positive plausibility difference, the others: a smaller positive difference, a difference close to zero, a large negative difference, and a smaller negative plausibility difference. An example of a complete set and the corresponding material in Experiment 1 appears in Table 1.

Please Insert Table 1 About Here

Results and discussion

The plausibility differences between the average rating for each sentence in a relevant pair were calculated as follows. For material in Table 1, the average rating of If John had driven to the beach, he might have brought along a surfboard was subtracted from the average rating of If Henry had spoken at a meeting, he might have brought along a surfboard, the average rating of If John had driven to the beach, he might have stopped at a store was subtracted from the average rating of If Henry had spoken at a meeting, he might have stopped at a store, and so on, to get the plausibility differences for the sentence pairs used in Experiment 1. The sign of the difference specified the preferred pronominal referent for the sentence pairs of Experiment 1 since the differences are calculated in a uniform manner for

all sentences. Thus, a positive difference for the sentence pairs in Table 1 would indicate that the pronoun is likely to refer to John; a negative difference that the pronoun is likely to refer to Henry; a difference close to zero would leave the referent unspecified. The appendix contains the forty sentence pairs and their respective plausibility differences. Table 2 contains the plausibility differences averaged over all eight sets for the five different sentence pair types. Each value is significantly different from the others (by Scheffe test, $p < .02$).

Please Insert Table 2 About Here

Experiment 1

Experiment 1 used the material analyzed in the preliminary experiment to examine anaphoric processing in ambiguous sentence pairs, such as John stood watching while Henry fell down some stairs. He tripped over a skate. Subjects had to specify the referent of the pronoun in five types of sentence pairs: those with large positive plausibility differences, with small positive plausibility differences, with negligible differences (positive or negative), with large negative differences and small negative differences. If pronoun assignment is affected by contextual constraints, then subjects should select the referent indicated by the sign of the plausibility difference and make this selection more quickly the larger the difference. Of course, the smaller the absolute value of a plausibility difference the weaker the strength of the contextual constraint and the less chance there is that subjects will select the preferred referent. When the

plausibility difference is close to zero, subjects should show no clear preference for either of the two possible referents and take longer to make an arbitrary decision between the two than they did in selecting the preferred referent of the sentence pairs with large and small positive or negative plausibility differences.

Thus, in Experiment 1, it should be found that:

(1) the number of times a subject choses a given referent should depend on the type of sentence pair, the smaller the plausibility difference the less often one referent is preferred over another.

(2) subjects should prefer the intended referent over the unintended referent, unless the sentence pair's plausibility difference is close to zero, in which case, no preference should be observed.

(3) response latencies should be longer the smaller the plausibility difference.

Method

Subjects. Twenty-two subjects participated in this experiment. They were recruited through an advertisement in the Village Voice and received compensation.

Material. The forty sentence pairs analyzed in the preliminary experiment served as the stimulus material and had the form John (Henry) Xed while Henry (John) Yed. He Zed. There were eight sets with a representative of each of the five types of sentence pairs in each set. Half of the sentence pairs began with John, the other half with Henry. The material appears in the appendix.

Another list of forty sentence pairs was constructed by permuting the order of the two clauses in the first sentence of the pair. If any response bias exists, this manipulation should control for it. Thus, if John went to the party while Henry stayed at the store. He danced with some women. appeared in the first list, then John stayed at the store while Henry went to the party. He danced with some woman. appeared in the permuted list. The permuted sentence pairs retained the plausibility differences of the originals.

Design and procedure. A PDP-8 computer controlled the experiment and presented the material on a CRT. Half of the subjects saw the original forty sentence pairs; the other half saw the permuted set. The first sentence of a pair appeared on the CRT, and after carefully reading it, a subject pressed a button that erased the first sentence and presented the pronominalized sentence. The subject then specified the preferred referent by pushing as quickly as possible either a button corresponding to John or one corresponding to Henry. The latency between the appearance of the pronominalized sentence and the subject's response was recorded. Immediately following the subject's response, the screen was erased and the first sentence of the next pair appeared. The procedure was repeated until all forty sentence pairs were presented.

Results

Table 3 contains the response frequencies and latencies for the five types of sentence pair (eight exemplars per type). The response frequency measures the number of similar responses a

subject made for each type of sentence pair. Thus, the frequency of 7.23 for sentence pairs with large positive plausibility differences means that the "average subject" selected the preferred referent 7.23 times out of a possible eight. The three predictions offered at the beginning of the experiment on the assumption that contextual constraints would affect pronoun assignment were verified by and large.

Please Insert Table 3 About Here

First, subjects chose the preferred referent significantly more often than the non-preferred referent, but they also showed a slight, albeit nonsignificant preference for one of the referents in the neutral condition. Presumably, the average plausibility difference of the "neutral" sentence pairs, -.69, was not close enough to zero. Indeed, the direction of the preference could have been predicted from the sign of the difference.

Second, subjects generally chose the preferred referent more frequently the larger the corresponding plausibility difference. A significant difference between the frequencies associated with sentence pairs with large and small positive plausibility differences was not found (using a Friedman, χ^2_r (1) = .73 n.s.); however, there is a main effect if the average of frequencies for sentence pairs with large and small positive plausibility differences and the other three types of sentence pairs are compared (χ^2_r (3) = 57.3, $p < .01$). It is possible that a ceiling effect could have obscured any difference that might exist between sentence pairs with large and small plausibility differences.

Third, and most importantly, subjects took longer to choose the preferred referent the smaller the associated plausibility difference. The analysis concentrated on responses that selected the preferred referent since it was not clear how to interpret responses that assigned to the pronoun the non-preferred referent. Exclusion of these data is like exclusion of "error" data in other reaction time experiments. When the sentence pairs had a negligible plausbility difference there was no preferred referent, and analysis concentrated on the average latencies for both possible responses. Hence the comparison using an analysis of variance was among response latencies for the preferred referent of sentence pairs with large and small positive plausibility differences, and responses latencies for any referent choice for sentence pairs with negligible plausibility differences. A similar comparison was made for the sentence pairs with negative plausibility differences. Both analyses yielded significant main effects (for the positive comparison: min $\underline{F}'$ (2,24) = 5.24, $\underline{p} < .02$; for the negative comparison: min $\underline{F}'$ (2,25) = 5.23, $\underline{p} < .02$).

The distance between a pronoun and its antecedent did not have a statistically significant effect on assignment time. The experimental design provided a control for the effect of contextual constraints on assignment since half of the subjects saw sentence pairs that were constructed by switching the order of the first sentence of the pairs that the other half examined. Again, analysis is limited to the responses that subjects made when selecting the preferred referent. The average response latency was 4278.2 msec when the selected referent was in the first clause, 4146.6 msec

when it was in the second clause ($F(1,21)=1$, n.s.). This finding suggests that distance may not contribute to assignment time when the pronoun is ambiguous.

The results indicate that integration occurs during assignment. Moreover, they provide some support for a plausibility difference as a measure of contextual constraints. The next experiment attempts to determine whether contextual constraints affect assignment time when the coreference is unambiguous.

Experiment 2

The ambiguous sentence pairs in Experiment 1 can be transformed into unambiguous pairs such as John stood watching. He ran for a doctor after Henry fell down some stairs. The pronominal coreference in this sentence and the other transforms is syntactically constrained (Langacker,1969). Although these transformed sentences have approximately the same strength of contextual constraint as the original, it is not clear whether a person would consider these constraints when specifying the pronominal referent. A model of pronoun assignment could have integration occur during or following assignment. If integration follows assignment, then only syntactic or lexical constraints should affect assignment time. Alternatively, if integration occurs during assignment, then contextual constraints should affect assignment time.

Experiment 2 investigated these two alternatives using the transforms of the sentence pairs in the first experiment. Only transforms with moderate or large plausibility differences are used. Thus, each sentence pair is reasonable and clear and any difference in assignment time could not be attributed to the nonsensical quality of some of the sentences.

Subjects in Experiment 2 could always select the first noun phrase of the pair without reading all of the material and always select the correct referent. In order to induce the subject to read the entire sentence pair, ambiguous distractors contextually slanted toward a noun phrase following the pronominalized clause were also presented.

Method

Subjects. Twenty-five respondents to a Village Voice advertisement participated in this experiment and were paid for their efforts.

Material. Eighteen experimental sentence pairs and eighteen distractor pairs served as the experimental material. The experimental pairs were selected from unambiguous variants of the sentence pairs in Experiment 1 so that nine of the experimental pairs had a high plausibility difference and nine a low (moderate) plausibility difference. In Experiment 1, the sentence pairs had the form John Xed while Henry Yed. He Zed. The experimental pairs in this experiment had the form: John Xed. He Zed after Henry Yed., when John was the preferred antecedent in the original pair in Experiment 1, and Henry Yed. He Zed after John Xed., when Henry was the preferred antecedent.

The distractor pairs were constructed especially for this experiment, and had the form: John Xed. After he Zed, Henry Yed., John Xed. After Henry Yed, he Zed. or John Xed. Henry Zed after he Yed. We attempted to slant the preferred antecedent toward the second noun phrase, even though each of these sentences was

ambiguous.

As in Experiment 1, half of the sentence pairs began with John, half with Henry. Occasionally, while was substituted for after to smooth the prose.

Design and procedure. The design and procedure was similar to Experiment 1.

Results

Table 4 indicates that subjects nearly always chose the correct referent, probably making the few errors they did by accidently pushing the wrong button, and took longer to specify this referent in an unambiguous sentence with a moderate than a large plausibility

Please Insert Table 4 About Here

difference (min $F'(1,14)=5.44, p < .05$). The ambiguous distractors had a longer average response latency than the unambiguous experimental sentences and the large number of responses specifing the second noun phrase as the preferred referent indicates the subjects did not adopt the strategy of selecting the first noun phrase in the second sentence of each pair.

The results suggest that people do integrate the information in the pronominalized clause with the information in the preceding text even when integration is not necessary for assignment.

General Discussion

Various models of pronoun assignment have stressed the importance of syntactic, lexical, and surface (such as distance) considerations. Since each of these factors can affect assignment without requiring integration, most models of assignment have assumed that integration occurs after rather than during assignment (for example, Clark and Clark, 1977,p.96). The importance of the present

work is not that it demonstrates context effects, but that it establishes these effects when assignment could be accomplished on syntactic grounds alone. This finding suggests that integration occurs during rather than following assignment. Moreover, the finding in Experiment 2 that subjects took longer to process ambiguous sentence pairs than unambiguous sentence pairs suggests that the contextual constraints work in tandem with the syntactic constraints.

Most models of pronoun assignment posit that a pronoun triggers a search through the memory representation formed from previous text. Each alternative antecedent encountered during this search is evaluated on syntactic, lexical, and given the present research, pragmatic grounds. The aim of the search is to discover among the various alternatives the correct one. The information in the pronominalized clause is then bound to the node or trace of the correct antecedent. Although early models of assignment placed severe restrictions on the pattern of the search (Springston, Note 2), more recent considerations have allowed the search pattern to vary with factors such as syntactic and discourse structure or prosody (see Clark and Sengul,1979).

The present work suggests that a pronoun might not necessarily trigger a search, but provide a signal to the reader to integrate the information in the pronominalized clause with the information in the preceding text. This position is not incompatible with a search model since one aspect of integration is search. However, integrating text may not involve just search. Often it requires complex inferencing (Clark and Haviland,1977). Indeed, a pronoun may often refer to something that is not explicitly stated. For

example, it in (7) cannot be said to corefer with tail, for the tail that grew back is not the tail that fell off. If it is

(7) The alligator's tail fell off, but it grew back.

bound to a memory trace of the previous text, rather than an inference based on the text, then the wrong tail would grow back.

The integration approach makes pronouns functional elements of discourse and not merely stylistic variants of preceding noun phrases (cf. Geach,1962). Repeated noun phrases could not unambiguously signal integration since they can introduce a new character as well as refer back to an old one. A pronoun, however, always provides an unambiguous signal. Indeed, pronouns probably facilitate integration when compared to repeated noun phrases. Work on memory for discourse with pronouns or noun phrases suggests that this is the case. (Lesgold,1972).

Much effort has been made in the last decade in developing a model of pronoun assignment. The necessary data for a model are only beginning to appear. The present research contributes to this effort by indicating that integration occurs during assignment even when the coreference is syntactically constrained, and consequently suggesting that pronouns serve as signals to integrate rather than triggers to search. This later assertion implies that pronouns serve a different discourse function than repeated noun phrases. However, more research on the anaphoric processing of repeated noun phrases is needed to assert this latter hypothesis with certainty.

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Footnotes

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Table 1

Example of a complete set of sentence pairs in Experiment 1 and their corresponding constituents in the Preliminary Experiment

1. Henry spoke at a meeting while John drove to the beach. He brought along a surfboard.

   If Henry had spoken at a meeting, he might have brought along a surfboard.

   If John had driven to the beach, he might have brought along a surfboard.

2. Henry spoke at a meeting while John drove to the beach. He stopped at a store.

   If Henry had spoken at a meeting, he might have stopped at a store.

   If John had driven to the beach, he might have stopped at a store.

3. Henry spoke at a meeting while John drove to the beach. He looked toward a friend.

   If Henry had spoken at a meeting, he might have looked toward a friend.

   If John had driven to the beach, he might have looked toward a friend.

4. Henry spoke at a meeting while John drove to the beach. He knocked over the water.

   If Henry had spoken at a meeting, he might have knocked over the water.

   If John had driven to the beach, he might have knocked over the water.

5. Henry spoke at a meeting while John drove to the beach. He lectured on administration.

(Table 1 cont.)

If Henry had spoken at a meeting, he might have lectured on the administration.

If John had driven to the beach, he might have lectured on the administration.

Table 2

Average Plausibility Differences for the Five Types of Sentence Pairs

Sentence Type	Average Plausibility Difference
large positive	2.84
small positive	1.46
neutral	-.69
small negative	-2.01
large negative	-3.80

Table 3

Average Number of Choices for a Referent and Associated Average Response Latencies (in msec) for Five Sentence Types

Preferred Referent	Strength of Plausibility Difference	Referent Choice A Frequency	A Latency	B Frequency	B Latency
A	large positive	7.23	3162	.77*	5826
A	small positive	7.27	3862	.73*	5201
None	negligible	2.82	6211	5.18	6075
B	small positive	1.73	7623	6.27*	4166
B	large negative	.36	6214	7.64*	2972

*Significant differences between the frequencies of the two referent choices, $p < .01$.

Table 4

Average Number of Choices for a Referent and Associated Response Latencies (msec) for Sentence Pairs with Large and Small Plausibility Differences

	1st Noun Phrase		2nd Noun Phrase	
Plausibility Difference	Frequency	Latency	Frequency	Latency
large (n=9)	8.9	6777.3	.1	4119.2
moderate (n=9)	8.8	7223.6	.2	2927.1
distractors	4.5	10275.0	13.5	9916.5

Appendix C

Anaphoric reference in written narratives of good and poor elementary school writers

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Submitted for publication

Anaphoric reference in written narratives of good and poor elementary school writers

This paper concerns the development of children's skill in producing coherent anaphoric reference in written narrative texts. In interpreting any written narrative, a reader must keep track of incoming information, constructing some organized representation of characters, objects and events by relating new information to old. By their choice of wording, writers can make that task more or less difficult, depending on the extent to which their language succeeds in communicating unambiguous and reasonably efficient information about how the various elements in a text are to be linked together. It is the language - the actual wording of a text - which in the end makes it easy or difficult for readers to draw the right connections and inhibit the wrong ones. At any point in the construction of a wording, writers have options. How an option is ultimately taken is surely a central problem for any theory of writing.

To a large extent text coherence depends on a writer's skill in signaling referents for noun phrases. There is considerable agreement that elementary children have difficulty signaling such information in their written narratives. (National Assessment of Educational Progress, 1977; Bartlett & Scribner, 1982). However, the nature of that difficulty remains unclear. Piaget, for example, has proposed that referential ambiguities in children's retellings of spoken narratives are due in large part to their inability to take account of a listener's point of view (Piaget, 1926) and many have assumed that this is the case for written narratives as well (Britton et al., 1975). Karmiloff-Smith (1979), however, has demonstrated that many difficulties are due to children's lack of knowledge

concerning how particular anaphoric devices function in particular contexts. Additionally, Bartlett, 1981, has proposed that some of children's difficulties may be due to lack of knowledge concerning other, non-anaphoric functions of referential language, particularly the role of referential language in providing information about text structure, and has suggested that good and poor writers may follow somewhat different strategies in selecting referential language for their texts. The present research continues this line of inquiry by comparing several aspects of referential language in written narratives of good and poor upper elementary and junior high school students. Its purpose is to define possible differences in the referential choices adopted by children in the two skill groups.

English has a rich set of devices for accomplishing anaphoric reference. These include pronouns, definite articles, demonstratives and lexical repetitions. (e.g., discussion in Halliday & Hasan, 1976)

Many factors are likely to influence selection of a wording, some trivial but some systematic and important. For example, a device's semantic content must enable readers to distinguish among potential alternative referents in a given context. For example, if a context includes several same-gender referents, then pronouns and nouns which encode only distinctions of gender may prove to be poor choices:

(1) One day two girls set out for the park. She (or: The girl) had a bike.

Other factors, such as writers' awareness of memory limitations may also influence choice of language. For example, Clancy (1980) reports that in spoken narratives, choice of pronoun or noun for anaphoric reference depends in part on the amount and complexity of text intervening between an anaphor and the last mention of its intended referent.

Wording may also be influenced by a writer's knowledge of special discourse conventions (e.g., the non-anaphoric use of pronouns and definite articles to introduce characters at the beginning of certain types of narratives) and awareness of special biases in reader interpretation (e.g., the effect of certain pronoun/noun configurations on reader empathy in narrative texts, as described in Kuno & Kaburaki, 1977). Language choice may also signal important features of text structure. For example, Clancy (1980) reports that while pronouns are the most frequent form of anaphora in adult spoken narratives, nouns are consistently used at major structural junctures such as the beginnings of new episodes and at places where changes in topic or thematic focus seem intended. For example, while pronouns are generally used if speakers maintain a referent as sentence subject (a position generally reserved for given information) nouns are frequently used when a switch in sentence subject seems intended. Compare (2) and (3):

(2) John got into an argument with Charlie. Then he hit him and knocked him down.

(3) John got into an argument with Charlie. Then Charlie hit him and knocked him down.

Taken together, these observations indicate that patterns of adult anaphoric language choice are pluri-functional, serving not only to direct co-referencing but also to provide listeners or readers with important signals concerning text structure, thematic organization and point of view.

We would expect children's choices to be less sophisticated, but the nature and extent of their immaturities remain unclear. Results of existing studies indicate that while some non-anaphoric functions of pronouns and articles may be acquired fairly early (e.g., deictic functions: Brown, 1973; Maratsos, 1976; de Villiers & de Villiers, 1974; semantic functions: Katz, Baker & McNamara, 1974)

anaphoric functions (particularly of definite articles) may not be established until the middle elementary years. For example, Karmiloff-Smith (1979) reports that French children's production and comprehension of the definite article's function in signaling second mention is only beginning to be well-established by age nine. Similarly, Warden (1976) reports that it is only at about the same age that English children begin to limit their use of definite articles in narrative discourse to definite reference. (See also references to studies of anaphoric pronouns in Palermo & Molfese, 1972, as well as comments in Loban, 1966.)

If we assume that written text, with its added burdens of spelling, punctuation and handwriting, is inherently more difficult for children to produce, then we might expect these difficulties to persist in children's writings well beyond the middle elementary years. This notion receives some support in a study by Bartlett & Scribner (1982). Results of this study, which examines referring expressions in narratives produced by 64 elementary children between the ages of 9 and 12, indicate that while the bulk of children's anaphora was coherent, two-thirds of the children did produce at least one ambiguous or anomalous referring expression. Moreover, the majority of these seemed to occur in contexts where two or more same-age, same-gender referents must be differentiated. There are several reasons why such contexts might prove troublesome, but perhaps most obvious is the fact that such contexts make it difficult to use pronouns and certain common nouns (e.g., boy, girl) unambiguously. Other devices can be used, of course (see examples, Table One), but as yet we have little information about the range of choices actually considered by elementary children.

Choice of wording will depend in part on the potentially differentiating information available in a particular context which, in turn, can depend on the extent to which a writer has particularized the telling of a tale by giving characters names and other differentiating attributes. (See examples 3 and 4, Table One) Data in Bartlett & Scribner, however, suggest that even when potentially differentiating information is available, children do not always take advantage of it in their referencing, suggesting that some children who provide well-particularized, detailed texts may nonetheless fail to appreciate the effects of context on language choice and the consequent usefulness of such differentiating information.

These observations lead to a number of questions concerning the source of children's difficulties. For one thing, it is unclear whether ambiguities reported in Bartlett & Scribner reflect a general lack of knowledge concerning the function of various anaphoric devices or a lack of knowledge concerning the effects of specific contexts (i.e., contexts in which same-age, same-gender characters must be distinguished) on their use. Additionally, although the work of Bartlett & Scribner did not examine non-anaphoric functions of referential language, it is possible that the problems of less skilled writers also reflect a lack of knowledge concerning the use of referential language to signal such features of text organization as beginnings of new episodes or changes in thematic focus.

More generally, observations in Bartlett & Scribner suggest that less skilled writers may have followed a somewhat different set of referencing strategies from those of their more skilled classmates: While more skilled writers may have adopted a pluri-functional approach to referencing, integrating information concerning a number of co-referential and structural considerations across a fairly wide span of text, below-average writers may have focused on a single

function, considering it only in relation to a narrower, more immediate portion of text. Among other things, this would predict that the texts of more skilled writers would consist of referencing devices that varied, depending on referential context and thematic focus; while texts of less skilled writers would tend to rely on use of a single device (such as pronouns) throughout. Additionally, while the hypothesized referencing strategies might lead to equivalent text coherence in contexts where a single device (i.e. pronouns) can distinguish among alternate potential referents, the strategies of these less skilled writers are predicted to lead to increased ambiguity in contexts where such a device is inadequate. The hypothesis is assessed in the present research.

One problem in evaluating such a hypothesis is the need for adequate control over the referential contexts in children's writings. Contexts differ in their effects on referential language. If children are free to invent any kind of narrative (as they were in Bartlett & Scribner), then important contextual features (such as number, age and gender of interacting characters; their roles as agents or recipients of actions; and the sequence of interactions) are likely to vary, affording a wide range of linguistic opportunities. Under such circumstances, referential skill would be entirely confounded with narrative strategy so that (for example) children choosing to write about interactions between two characters of different gender would have linguistic options (i.e., opportunities to use pronouns) very different from those available to children choosing to write about two same-gender characters. (Indeed, results of Bartlett, 1979, demonstrate that when children are free to devise the interactions in their stories, more and less skilled writers do construct plots which allow for a different range of options.) One strategy for controlling referential context is to ask children to write about events pictured in cartoons, a situation which insures that writers encode the same set of interactions while leaving them free to provide whatever wording and narrative rhetoric they can. In this way, effects of particular contextual features on children's language can be assessed, independent of narrative strategy, by comparing referring expressions across several contexts as elicited by events

pictured in several cartoons. This is the approach adopted here.

To summarize, the present research focuses on an analysis of anaphoric noun phrases in written narratives composed by more and less skilled writers in upper elementary grades. To control for referential context children are asked to write about events pictured in cartoons. To assess production in situations of varying referential complexity, children are asked to compose narratives about situations in which several same-age, same-gender characters must and need not be differentiated. Analyses assess relations among type of noun phrase, type of referential context and structural function as well as effects of these on referential coherence in children's texts.

Method

Subjects One hundred sixteen children in eleven public school classrooms participated. Included were 39 fifth graders (19 below-average and 20 above-average writers); 40 sixth graders (20 below- and 20 above-average writers); and 37 seventh graders (17 below- and 20 above-average writers). Current writing skill was assessed by asking classroom teachers to rate each student as being above-average, average or below-average in current writing achievement, using "the same crieria as you use when you assess children's achievement for their permanent records."[1] To insure that children were at least roughly comparable in other literacy skills, only children who were reading on grade level or above, as indicated by each child's most recent standardized reading score[2] were included in the sample.

Materials All children participated in two narrative writing tasks in which they wrote stories about events pictured in two seven-panel cartoons. Both depicted the adventures of three same-age, same-gender characters, one getting into a dangerour situation and the other two coming to the rescue. Two story themes were used, one about a boy who falls through some thin ice and the other about a girl who is accidentally cast adrift in a boat. Difficult-

and easy-context versions of each were created so that type of context and story content could be varied independently.

In the easy-context condition, the two rescuers always acted together, a grouping which made it possible for writers to use pronouns and other general nouns (boys, girls), since the semantic feature ±number would be sufficient to distinguish among participants in the events (e.g., he/they).

In the difficult-context condition, the two rescuers acted separately, so that writers were required at certain points in their stories to distinguish among three same-age, same-gender characters, a distinction which is not readily captured by the semantics of pronouns and those nouns which encode only features of gender and age (e.g., boy, girl, man, woman, etc.).

Procedures Tasks were administered by a research assistant in children's classrooms as whole-group activities on separate days about a week apart.[3] The order of tasks was counter-balanced across the two types of content and context conditions in the participating classrooms. Children were allowed up to forty minutes to complete each task.

Analysis Referential noun phrases in children's writings were coded according to a scheme described in Bartlett & Scribner, 1982. In brief, noun phrases were considered to make reference if they referred to concrete entities having continuous identity throughout a narrative. Following suggestions in DuBois, 1980, we designated as non-referential noun phrases within negative scope, comparatives and predicate nominals. Referential noun phrases were further characterized according to 1) coherence category; 2) linguistic category; and 3) type of thematic focus. With respect to coherence category, referential noun phrases were coded as 1) introductory (introducing a new element

in a text), 2)anaphoric (referring to a previously introduced element) or 3) ambiguous. A noun phrase was judged to be ambiguous if the text up through the next succeeding main clause did not enable a coder to determine its referent. With respect to linguistic category, noun phrases were coded as being either proforms or nouns. Nouns were further coded as being either character names or other types of nouns. Additionally, an analysis of thematic focus was performed on those anaphoric noun phrases which occured as subjects of finite verbs. These nouns were coded as either having the same referent as the subject of the immediately preceding finite verb (and thereby maintaining focus) or as having a different referent (and thereby switching focus).

Two researchers independently coded all noun phrases. Coder agreement ranged from 82% to 96%, depending on the type of information being coded. Except for judgments of coherence, disagreements were resolved through discussion. With respect to coherence category, judgments of an independant third coder were used in resolving disputes.

Results

Prior to further analysis, data from the ice skating and boating versions of the easy- and difficult-context stories were compared. Analyses of variance revealed no significant differences for any of the variables described below. Data from the two versions of each type of story were therefore pooled in the following analyses.

Prior to further analysis it was also necessary to assess story length in the various subject groups and experimental conditions since large differences in output alone would lead to large differences in most variables of interest.

Number of words per story was assessed by a three-way repeated measures analysis of variance, with grade and skill level as between-subjects factors and task (easy- or difficult-context condition) as the repeated, within-subject measure. This revealed a main effect for grade: $F(2,110)=36.39$, $p < .000$, MS = 240,333; a main effect for skill level: $F(1,110)=19.27$, $p < .000$, MS =127,275; no main effect for task and no interactions. As can be seen from Table Two older subjects produced longer stories and at each grade level, more skilled writers produced longer stories than their less skilled classmates. Since differences of this magnitude would lead to differences in most variables of interest, story length was used as a co-variate control in most of the following analyses.

It was predicted that whereas less skilled writers would tend to follow a simplified uni-functional referencing strategy, relying on pronouns to accomplish the bulk of their anaphoric reference regardless of context, more skilled writers would adjust their language to suit the constraints of particular referential contexts and structural characteristics. Predictions with respect to referential context are assessed by comparing children's use of pronouns and nouns in the easy- and difficult-context conditions. A four-way repeated measures analysis of co-variance (grade x skill level x task x anaphoric language pronoun vs. noun , with number of words per text as co-variate) reveals no main effects but does show the predicted skill level x task x anaphoric language interaction: F (1,110)=4.335, p=.04, MS =154.38. As can be seen in Table Three, while both above- and below-average writers use pronouns more frequently than nouns to accomplish anaphora in the easy-context condition, in the difficult-context above-average writers adjust their language so that nouns are now more frequent than pronouns while the language of below-average writers remains the same.

The hypothesis also predicted that anaphoric language of below-average writers would remain relatively unaffected by such structural characteristics as switches in thematic focus. In particular, it was predicted that while above-average writers would be more likely to adopt an adult-like pattern of referential language, using nouns more often than pronouns to indicate a switch in thematic focus (i.e., in situations where a switch in sentence subject referent occurs), below-average writers would be more likely to use pronouns predominately in both switch-referent situations and in situations where a subject referent is maintained from one clause to the next. The hypothesis is tested by comparing children's use of nouns and pronouns in same-referent and switch-referent situations. A five-way analysis of co-variance (grade x skill level x task x anaphoric language (pronoun vs. noun) x type of subject referent (same referent vs. switch referent) , with number of words per text as co-variate) reveals a number of main effects and interactions[4] two of which bear on our present hypothesis. First and most important, the analysis revealed a significant anaphoric language x type of sentence subject referent interaction which did not interact further with task, skill level or grade: F (1,110)=250.97, $p < .001$, MS = 2789.36. For all children and in all task conditions, pattern of language use differed in the same-referent and switch-referent situations. As can be seen in Table Four , the interaction seems to be due primarily to patterns of noun use: While nouns were relatively rare in same-referent situations, their use increased considerable when children indicated a switch in thematic focus by switching sentence subject referent. By contrast, relative frequency of pronouns in both situations remained about the same. That there were no interactions with grade or skill level indicates that this adult-like pattern of language use occured at all grade and skill levels.

The analysis of co-variance also revealed a main effect for type of sentence subject referent: $F(1,110)=265.22$, $p < .001$, MS=3093.68. This interacted with both grade: $F(2,110)=9.52$, $p < .001$, MS=110.99; and with skill level: $F(1,110)=4.40$, $p=.04$, MS=51.27. Overall, switches in thematic focus were more common than maintenance of focus, but as can be seen in Tables Five and Six , both the younger writers and the less skilled writers tended to switch thematic focus less often than older and more skilled subjects. Although this result does not bear on our hypothesis directly, it does indicate that texts of younger and less skilled writers differed from those of older and more skilled writers in structural characteristics and concomitant opportunities for wording. (For example, younger and below-average writers appear to be producing texts in which there are somewhat more opportunities for appropriate use of pronouns.)

Results of these analyses suggest that our initial hypothesis requires some modification. Although above- and below-average writers may well differ in the complexity of their referencing strategies, it is not the case that below-average writers follow a simplified strategy of using pronouns to accomplish anaphoric reference no matter what. While (as predicted) their choice of anaphoric language does appear relatively insensitive to the effects of referential context (see Table Three), they appear as sensitive as their above-average classmates to the effects of thematic focus, being able to increase or decrease their use of anaphoric nouns in accordance with the thematic characteristics of the situation.

Nonetheless, below-average writers' apparent failure to adjust their language to the difficult-context constraints does suggest that, as predicted, these writers should produce more ambiguity in the difficult-context condition

than their above-average classmates. The prediction is tested by comparing number of referring expressions judged to be ambiguous in the two writing tasks. A three-way analysis of co-variance (grade x level x task, with number of words per text as co-variate) revealed a main effect for task: $F(1,109)=4.25$, $p=.04$, $MS=11.37$; as well as a task x grade x skill level interaction: $F(2,109)=3.69$, $p=.03$. $MS=9.88$, presented in Table Seven. As can be seen, while difficult-contexts resulted in more ambiguity in all but the seventh grade above-average group, task differences were greater for below-average writers, especially at the seventh grade level. Moreover, above- and below-average writers differed in the linguistic characteristics of their ambiguities. As might be expected, given the fact that below-average writers persisted in their use of pronouns in the difficult-context condition, pronouns accounted for 79% of their ambiguities in these texts. (See Table Nine.) In contrast, pronouns accounted for only 53% of the ambiguities observed in above-average writers' difficult-context texts.

Taken together, this pattern of results suggests that much of the ambiguity in below-average writers' difficult-context texts results from an apparent failure to appreciate the effects of these referential contexts on pronoun use. Had these writers perceived the need to substitute nouns for certain pronouns, it is tempting to conclude that much of the ambiguity in their texts could have been avoided. However, as can be seen in Table Eight, not all problems observed in easy- or difficult-context texts resulted from a failure to switch from pronouns to nouns. In both conditions, ambiguous nouns were produced and an analysis of these indicates that they reflect a somewhat different set of problems.

For the most part, when ambiguous nouns occured in below-average writers' texts, they occured in situations where children attempted to use nouns to distinguish between one of a pair of unnamed characters (usually one of the two helpers). At times, the problem occured when children attempted to use words such as the other or another to refer to a second character in situations where the first had already served as the focus of attention. For example:

(4)...so the boy got hold of the stick and the other boy started to pull but the stick broke so the other boy skated as fast as he could....

In other cases, the problem seemed to involve omission of these distinguishing words:

(5)The other boys were trying to help him. One boy broke a branch and the other went for a hockey stick. The boy hurried to the boy in the ice but when the boy grabbed the branch the branch broke in half. Then the boy hurried with the hockey stick....

These two types of problems accounted for 67% of the ambiguous nouns in below-average writers' texts but were considerably rarer in stories of above average writers (28%), whose ambiguities reflected a more heterogeneous set of difficulties (e.g., use of one character's name for another; omission of any information about the identity of a speaker during an exchange of dialogue; erroneous use of third person reference in the midst of a first person narrative).

No doubt below-average writers' faulty use of words such as the other or another (as well as their failure to use terms such as these when required) reflects their lack of knowledge about how these terms work. But the relative frequency of these problems in below-average writers' texts may also reflect certain aspects of their basic narrative strategy. To see how this might

be so, it is necessary first to note that the problems encountered in using these terms could have been avoided altogether had writers chosen to use character names instead. That they did not do so in any particular instance may reflect strategy at the level of word choice (i.e., a preference for terms such as the other or another over names in situations where both are available) or strategy at the more basic level of narrative realization (e.g., a decision about whether to provide characters with names in the first place). To determine whether, in fact, below-average writers named their characters as frequently as above-average writers, the number of named characters per text was compared in a three-way analysis of variance (grade x skill level x task). The analysis revealed a main effect for level: $F(1,110)=10.99$, $p=.001$, MS=26.145; and no interactions. Across both conditions, above-average writers named an average of 2.6 characters per text while below-average writers named an average of 1.8. This suggests that in situations where nouns are required for referencing (e.g., when writers make a switch in sentence subject referent), below-average writers did not have the same options for wording as their above-average classmates.

It would follow that names would be less likely than other types of nouns to occur in the non-pronominal referring expressions of below-average writers. A four-way analysis of co-variance comparing the frequency of names with other types of nouns in children's referring expressions (grade x skill level x task x type of noun (name vs. other noun), with number of words per text as co-variate), revealed a main effect for type of noun ($F(1,110)=117.11$, $p<.001$, MS=5612.07; as well as a type x grade interation: $F(2,110)=5.09$, $p=.008$, MS=243.85; and a type x level interaction: $F(1,110)=11.05$, $p=.001$, MS=529.51. Overall, the mean number of names per text was 9.82 while the mean number of other nouns was 2.85. But as predicted, names were less frequent and other nouns more frequent in the non-pronominal referring

expressions of below-average writers. (See Table Nine) Moreover, regardless of skill level, as children got older their use of names increased while their use of other nouns decreased. (See Table Ten)

Taken together, these analyses suggest that below-average writers are doubly disadvantaged in their production of non-pronominal anaphoric reference: on the one hand, they seem to be less knowledgeable about the way in which certain distinguishing words (e.g., the other, another) function to differentiate individuals within a set of characters; at the same time, they are less likely to adopt the simpler strategy of using names to differentiate characters, possibly because they are less likely to name their characters in the first place. This suggests that even when these writers attempt to adjust their language to the constraints of referential context, problems of vocabulary and of narrative strategy may reduce the effectiveness of these attempts.

Discussion

It was predicted that the texts of above- and below-average writers would reflect different referencing strategies: that more skilled writers would be more pluri-functional in their approach while less skilled writers would tend to ignore many co-referential and structural features. Effects of referential context and thematic focus on patterns of language use were assessed with results that were somewhat contrary to predictions: Although (as expected) differences in referential context seemed to have little effect on below-average writers' pattern of language use, these writers were as sensitive as their above-average classmates to changes in thematic focus, altering the relative proportion of anaphoric nouns in an adult-like fashion, depending on the thematic status of particular referents. This suggests that these two features of

children's referencing may draw on somewhat different skills, with thematic focus presenting children iwth what may be a simpler problem to solve.

For example, it can be argued that in responding to features of referential context, writers must evaluate similarities and differentiating characteristics of potentially confusable referents, mapping these onto semantic features of cndidate linguistic expressions. Among other things, this requires that writers evaluate potential referents across a wide enough span of text, using information which would be available to readers as well as themselves (i.e., information actually on the page and not simply what a writer hoped to put there). It is possible that below-average writers' persistence in using pronouns in contexts where pronouns fail to differentiate among potentially confusable referents may reflect difficulties with both aspects of the task. For example, writers may consider as referential context only features of the clause under construction and its immediate predecessor, when in fact the context operating on anaphoric binding may include elements in text several clauses back. At the same time, problems may arise from below-average writers' failure to differentiate their intentions from information actually presented to a reader in the text. (The effects on communication of children's failure to make such differentiation have been discussed by a number of investigators, including Piaget, 1926; Glucksberg, Kraus & Higgins, 1975; Bartlett, 1982.)

In contrast, thematic focus (at least as measured here) presents writers with a problem that may be simpler on at least two counts: first and perhaps most important, effects of thematic focus on wording seem to be less a function of reader's knowledge than of writer's intention: differences between the two are not at issue since these will not ordinarily bear on how thematic focus is best signaled. At the same time, thematic status of an intended referent in our research is evaluated in terms of a two-clause span which may

be considerably shorter than the span affecting judgments of referential context and ambiguity.

Taken together, these speculations may account for observed differences in the effect of thematic focus and referential context on below-average writers' pattern of language use. It should be noted, however, that referential problems in the texts of below-average writers seemed to reflect other difficulties as well. For one thing, even when below-average writers attempted non-pronominal reference in difficult contexts, problems of vocabulary and narrative strategy reduced the effectiveness of these attempts: Below-average writers often seemed to be unfamiliar with the way in which words such as the other or another function to differentiate among characters but were hindered from adopting the simpler strategy of using names to differentiate characters by their frequent failure to give characters names in the first place.

A final point about these data concerns their relative robustness. Patterns of language use observed in the difficult- and easy-context texts occured despite the fact that children wrote in a wide variety of narrative forms. In these eliciting conditions, we attempted to manipulate anaphoric language by constraining the event structure in which context develops while leaving other aspects of children's story-telling free to vary. Under the circumstances children could and did adopt a variety of story-telling techniques, including a variety of narrative voices and temporal organizations, varying use of dialogue (including stories told entirely in dialogue), various amounts of scene-setting and motivational information and commentary to the reader. Given the relatively unconstrained nature of the rhetoric and the very different types of texts that emerged, the fact that significant and consistent context effects were obtained is probably a sign that the phenomena which were examined are fairly robust and quite independent of particular rhetorical organization.

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Footnotes

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[1]It would no doubt have been preferable to have used some standardized writing achievement test, but appropriate ones were not available. Moreover, as children's writing is customarily assessed by teacher evaluation in these schools, the present method seemed a valid way of establishing samples of good and poor writers.

[2]In many cases, below-average writers turned out to be below-grade readers. Since we wished to unconfound reading and writing difficulties insofar as this was possible, these writers were not included in our sample. Difficulty in finding below-average writers who were reading on grade level accounts for the slight discrepancy in numbers of below- and above-average writers in the fifth and seventh grade samples.

[3]Children also participated in another writing activity, administered one week prior to the present tasks, and an editing task, administered one week after the present tasks. Results of these are described in Bartlett, 1982.

[4]Other effects did not interact with thematic focus and are therefore not germaine to the present discussion. They include a main effect for type of anaphoric language: $F(1,110)=15.27$ $p < .001$, $MS=282.78$; a type of language x task interaction: $F(2,110)=4.59$, $p=.03$, $MS=37.68$; a type of language x grade interaction: $F(2,110)=3.42$, $p=.04$, $MS=63.36$; and a type of language x grade x level interaction: $F(2,110)=7.55$, $p=.001$, $MS=139.77$. Essentially, these show that pronouns were more frequent than nouns; that the difference was more pronounced in the easy-context condition; that the difference tended to increase with age. The three-way interaction showed an inconsistent pattern, however, with pronouns being more frequent than nouns except in the fifth grade above-average and sixth grade below-average groups.

Table One

Examples of referencing

Ambiguous co-referencing

(1)One day two girls set out for the park. She had a bike....

(2)One day two girls set out for the park. The girl had a bike....

Definite referencing through the addition of new information

(3) One day two girls named Sandy and Karen went to the park. Sandy had a bike....

(4) One day two girls set out for the park. One was very athletic and the other hated sports. The athletic one had a bike....

Indefinite referencing

(5) One day two girls went to the park. One had a bike....

(6) One day two girls went to the park. They had a bike....

Table Two

Mean number of words per story

Grade level	Skill level	
	Below-average	Above-average
fifth	98.66	117.05
sixth	129.625	176.40
seventh	182.38	257.725

Table Three

Mean number of anaphoric nouns and pronouns in subjects' easy- and difficult-context narratives, with number of words per text as co-variate

	Above-average writers		Below-average writers	
	pronouns	nouns	pronouns	nouns
Type of narrative				
easy-context	18.19	16.85	17.98	17.86
difficult-context	15.70	18.82	18.41	17.95

Table Four

Mean number of pronouns and nouns in situations where a switch in sentence subject referent occurs and where sentence subject referent is maintained from one clause to another, with number of words per text as co-variate

	Type of anaphoric language	
	pronoun	nouns
Type of sentence subject referent		
Same referent	5.75	1.17
Switch referent	5.94	0.30

Table Five

Mean number of switches in sentence subject referent and maintenance of sentence subject referent produced by subjects at each grade level, with number of words per text as co-variate

	Type of sentence subject referent	
	Same referent	Switch referent
Grade level		
Fifth	4.14	6.97
Sixth	3.49	6.59
Seventh	2.75	7.81

Table Six

Mean number of switches in sentence subject referent and maintance of sentence subject referent produced by above- and below-average subjects, with number of words per text as co-variate

	Type of sentence subject referent	
	Same referent	Switch referent
Skill level		
Above-average	3.07	7.20
Below-average	3.85	7.04

Table Seven

Mean number of ambiguities in easy- and difficult-context texts of subjects at each grade and skill level, with number of words per text as co-variate

	Type of subject					
	Above-average writers			Below-average writers		
	5th grade	6th grade	7th grade	5th grade	6th grade	7th grade
Type of text						
Easy-context	.49	.14	.98	.53	.51	.49
Difficult-context	.57	.39	.64	.85	1.06	2.27

Table Eight

Percentage of pronouns and nouns among ambiguities produced by above- and below-average writers in easy- and difficult-context conditions

	Above-average writers		Below-average writers	
	Easy-context	Difficult-context	Easy-context	Difficult-context
Type of ambiguity				
pronouns	38%(12)	53%(17)	41%(12)	79%(62)
nouns	62%(20)	47%(15)	59%(17)	21%(16)

Values in parentheses are number of ambiguities

Table Nine

Mean number of names and other nouns in non-pronominal referring expressions of above- and below-average subjects, with number of words per text as co-variate

	Type of language	
	names	other nouns
Type of subject		
Above-average	10.80	1.69
Below-average	8.84	4.01

Table Ten

Mean number of names and other nouns in non-pronominal referring expressions of subjects at each grade level, with number of words per text as co-variate

	Type of language	
	names	other nouns
Grade level		
Fifth	9.12	4.24
Sixth	9.30	3.09
Seventh	11.03	1.23

Appendix D
Learning to Revise: Some Component Processes

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This chapter appears in What Writers Know, M. Nystrand (Ed.), New York: Academic Press, 1982.

Chapter 13

Learning to Revise: Some Component Processes

Elsa Jaffe Bartlett

In this chapter, I describe results of some recent studies of editing and revision. The data were obtained over a 2-year period from some 250 elementary and junior high school students in grades four through seven. The research was intended to assess certain claims, based on current models of revision processes, about difficulties that students might encounter in detecting and correcting text problems. For reasons that will become clear, it seemed desirable to focus on problems of syntactic anomaly and referential ambiguity. The results, however, should be readily applicable to a range of revision problems.

I will begin with a general discussion of current research, focusing on some of the problems inherent in current formulations. I will then discuss three distinct components of revision processes, illustrating the discussion with results from my own research.

WHAT IS REVISION?

Revision seems to be an essential component of virtually every attempt to construct a model of the writing process. Depending on the model, it is viewed as a separate activity, performed on completed drafts (e.g., Murray, 1978) or as a recursive activity, performed at any point in the writing process on any type of text segment (e.g., Collins & Gentner, 1980). But

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whatever its place in the writing process, revision is invariably distinguished from text generation by the fact that it involves some fairly explicit processes of comparison, generally between some segment of a text (a word, phrase, sentence, paragraph, etc.) and some representation of a writer's knowledge or intention, which results in some attempt to change existing text.

There is no doubt that writers can deliberately initiate revision processes and further, that writers can specify a type of revision in advance. For example, a writer might decide to review a text for transcription problems or problems of interpretability. However, for many writers (and especially beginners), detection seems to be a fairly haphazard process, often proceeding without well-planned goals or strategies. For example, Shaughnessy (1977) claims that her adult beginners often seemed to initiate revision processes prematurely, after production of no more than a sentence or two. Calkins (n.d.) has noted that beginners often have difficulty maintaining a plan for a revision.

Professional writers and writing teachers are fond of pointing out that writing is essentially rewriting (e.g., Murray, 1978) and that students tend to do precious little of it. Moreover, when students revise at all, they generally focus on changes at the level of individual words or phrases, often dwelling on problems of transcription, syntactic form (e.g., subject-verb agreement) or lexical choice. This appears to be as true of college freshmen (e.g., Sommers, 1978) as elementary and high school students (e.g., National Assessment of Educational Progress, 1977; Stallard, 1974).

More important, perhaps, is the finding that revisions do not always result in appreciably better text. For example, although researchers such as Beach (1979) and Bamberg (1978) report that revisions of their high school and college freshman subjects did result in qualitatively better drafts, data from 9-, 13- and 17-year-old subjects in a recent National Assessment of Educational Progress show that revisions did not reliably improve the holistic ratings of texts. Similarly, Scardamalia, Bereiter, Gartshore and Cattani (n.d.), and Bracewell, Bereiter and Scardamalia (n.d.) found no reliable differences in the quality of original and revised versions of essays produced by elementary and high school students.

In a recent review of the literature, Gantry (1980) attributes these inconsistent results to differences in the complexity of measures used in evaluating students' drafts. However, most evaluations appear to be based on comparable holistic schemes that take into account complex aspects of intersentence organization as well as aspects of vocabulary choice and mechanics. It seems to me more likely that differences in results can be attributed to characteristics of the editing tasks themselves. In particular, those studies that report gain in quality seem to involve situations where revisions are based on the evaluations of peers or teachers. When evaluations are generated by the writers themselves, improvement in quality is much less likely.

Accounting for Student Difficulties

Researchers have attempted to account for students' difficulties in a number of ways. For one thing, as Murray and others have noted, students are rarely required to revise their compositions. Most get away with first-draft copy and even when revision is demanded, it usually amounts to little more than corrections of mechanical errors. Research by Calkins (1979) has indicated that when elementary students are given ample opportunity to practice, they can eventually develop sophisticated revision skills. However, research based on Piagetian theories of cognitive development suggests that there may be certain cognitive limits on the skills that even these practiced youngsters are able to acquire.

In his original observations, Piaget (1926) was able to demonstrate striking ambiguities and omissions in elementary-age children's attempts to describe or explain events and in their retellings of stories. These children often failed to supply sufficient information for listeners to determine word referents and intended logical relations, and in general Piaget concluded that they seemed unable to adjust the content of their messages to meet the needs of listeners who did not share their knowledge of a topic. Piaget attributed the difficulty to children's inability to represent an event from two points of view (their own and a listener's), claiming that childish "egocentrism" would eventually diminish as children learn to maintain two representations and make rapid "decentered" comparisons between them.

As characterizations of cognitive aspects of revision, Piagetian notions of egocentrism and decentered perception are attractive because they attempt to describe limits of children's comparison processes—processes that are certainly at the very heart of revision. However, attempts to invoke Piagetian explanations of students' difficulties have had only limited success. In most attempts, beginners' problems are characterized as stemming from some failure to represent an "audience's point of view," but unfortunately, the meaning of audience in this context remains somewhat vague. Although experienced writers certainly take pains to shape their texts to suit the knowledge and expectations of their intended readers, it is not clear how a failure to represent the viewpoint of intended readers can account for more than a small proportion of students' revision failures.

Interpreting Piaget more broadly, Bracewell, Bereiter and Scardamalia have suggested that students' difficulties stem from an inability to compare any two representations of the same event, claiming that for elementary students, revision will be ineffective regardless of the circumstances:

> Central to Piaget's concept of decentration is back-and-forth comparison, not simple shifting of viewpoint and . . . this lack of comparison may lie behind much that appears egocentric in children's behavior. Without comparison, of course, revision is impossible and what appears instead is pseudo-revision, generation of new material using old as stimulus. With a time lag (between composition and revision) or with an unfamiliar

composition to work with, the new material produced may be different from the old, but it will not necessarily be better [p. 1].

Attempts to test this notion, however, have met with mixed success. When authors' original and revised drafts were compared holistically, these researchers did indeed find that revision resulted in no improvement, regardless of whether revision occurred immediately after composition or after a week's delay. However, contrary to these authors' predictions, attempts by nonauthors to revise these same texts resulted in appreciable improvement, provided that an editor was sympathetic to the content and point of view expressed by an author.

One problem in interpreting these results is the lack of details concerning students' actual revisions. For example, differences may have been due to the fact that nonauthors were better able to detect text problems or, alternatively, despite equivalent detection, that nonauthors were better at formulating an effective correction. Unfortunately, these questions cannot be addressed by the holistic ratings reported in these studies. To approach them, more fine-grained analyses based on more precise definitions of components of revision processes are necessary.

COMPONENTS OF REVISION PROCESSES

How can we characterize different components of revision?

We might begin with the observation that revision seems to involve both evaluation and correction, with correction being motivated by the detection and identification of some malfunction or discrepancy in existing text. For example: "The Editing process examines any material that the writer puts into words.... Its purpose is to detect and correct violations in writing conventions and inaccuracies of meaning and to evaluate materials with respect to the writing goals [Hayes and Flower, 1980, p. 16]." Under most circumstances, these processes are carried out together, but it is easy to see that difficulties might develop somewhat independently in any one. For example, most teachers can recall students—particularly beginners—who notice that something is wrong with a text without being able to identify the problem, complaining only that it "sounds funny" or "isn't right." Similarly, students may be able to identify a problem but produce an ineffective change. The point, then, is that these different processes are likely to require different sorts of skills while at the same time presenting students with different sorts of difficulties. We will consider each in turn.

Detection Processes

Revision is generally triggered by awareness (however inchoate) of some malfunction or discrepancy—perhaps a violation of writing convention, an

ambiguity or logical inconsistency. This awareness must surely involve contact (at some more or less conscious level) between existing text and some body of knowledge from which text alternatives might be formulated (i.e., knowledge of text conventions or recollection of original goals or intended meanings). The nature of that contact may be more or less explicit and may involve more or less elaborate processes of comparison, depending on the skill of the writer and the difficulty of a particular problem. For example, skilled writers may find some problems so routine that they are hardly aware of the process by which the need for alternative text is formulated, whereas other problems may require lengthy comparison and deliberation.

In any case, if (as seems likely) detection processes require some contact between existing text and a body of knowledge from which alternative texts might be constructed, then it is easy to see that revision tasks may be characterized in terms of the ease with which such contact can be effected—for example, the ease with which relevant knowledge can be recollected or represented. For example, detection of some malfunctions may draw on knowledge of well-practiced skills that have become highly automatic and thus easy to recollect. For the most part, these will involve highly conventional aspects of language that remain more or less invariant in form from one composition to the next. Other text revisions may involve knowledge that is more ad hoc: aspects of content and language assembled to meet the needs of a particular composition. These may be more inchoate and thus difficult to recollect during revision, making it more difficult for students to detect discrepancies between existing text and some originally intended meaning, as well as between existing text and some previously unrecognized and potential meaning.

These examples suffice to indicate that detection of different types of malfunctions is likely to involve somewhat different types of knowledge. It may also be the case that knowledge may be much more accessible under some conditions than others. For example, we might imagine that although most conventional linguistic knowledge (e.g., correct syntax, punctuation, spelling) might be readily available across a broad range of revision situations, other types of knowledge might be less accessible. For instance, it might be fairly difficult for students to make judgments about text interpretability when evaluating their own texts. To appreciate how this might occur, consider once again the task facing a writer who sets out to reread his or her own text for revision. Generally, when we read, we actively seek to understand a text: We attempt to fill in missing information, draw inferences and predict intended meanings. Revision, however, requires a somewhat different approach. As one writer and writing teacher has observed: "Writers perform a special, significant kind of reading when they read their own writing in process. Writers must achieve a detachment from their work that allows them to see what is on the page, not what they hope will be on the page [Murray, 1978, p. 95]."

Of crucial importance is a writer's ability to inhibit interpretations based on knowledge of the writer's own intentions. Thus, for example, although a writer may know an intended referent for a word, in evaluating the interpretability of the particular text, a writer must inhibit any tendency to use this "privileged" knowledge in computing a meaning, limiting his or her interpretative activities to whatever can be constructed from the information actually available on the page. For example, a writer may know (and intend to say) that Sam Smith is the husband or Sue and the brother of Sarah, but if this information has not already been established in the discourse, then a phrase such as "her husband" or "her brother" will be difficult to interpret.

Initially, at least, this may require that writers develop some explicit awareness of the kinds of processes (inferencing, expecting, etc.) through which their interpretations are accomplished, and it may well be the case that there are large individual differences in the ease with which explicit knowledge of these processes is acquired (Gleitman & Gleitman, 1979).

The notion of privileged information, of course, refers only to writers' knowledge of their own intentions. Obviously, writers will not have such information about texts composed by others and will not be faced with the problem of inhibiting certain interpretive activities. This suggests (as the folklore would have it and contrary to the hypotheses of Bracewell *et al.* n.d.) that student writers may find it considerably easier to detect problems in texts of others than in their own, but only those problems that can be masked by interpretive activity based on the use of privileged information. Thus, although we might expect students to be more adept at detecting logical inconsistencies or referential ambiguities in the texts of others, we would expect to find no difference in their detection of spelling errors or faulty syntax or other problems related to knowledge of language conventions.

These hypotheses were investigated in a series of studies designed to assess students' abilities to detect various types of problems in their own texts and in texts composed by others. Given the above hypotheses it seemed important to investigate problems whose presence in an author's text might be masked by use of privileged knowledge. For this, referential ambiguity seemed ideal, especially since results of previous research indicated that ambiguities were likely to occur fairly often in the first drafts of narratives by elementary students (Bartlett & Scribner, in press). Additionally, it seemed important to study a type of problem less likely to be masked by privileged knowledge. Although we might have examined problems of spelling or punctuation, we have chosen to focus on detection of certain syntactic anomalies—missing subjects, predicates, or prepositions—partly because detection of these seemed to involve larger segments of text than would be the case with spelling and partly because these also have been found to occur fairly frequently in children's narrative texts.

Two studies were carried out involving a total of 110 fourth and fifth graders. In each, our main purpose was to compare children's detection of these problems in their own texts with detection of comparable problems in the texts of others. In both studies, children composed and (one week later) edited a short narrative for publication in a class anthology. (Original texts were xeroxed prior to editing so that original and edited versions could be compared and so that children could edit from their own original copy.) In addition, a week after editing their own texts, children were asked to edit a series of eight short paragraphs adapted by a researcher from texts produced by children in a previous study. Of these, six contained faulty referring expressions and two, a missing subject or predicate (see examples in Table 13.1).

Data from the fifth-grade study will be described in detail. Seventy-nine children drawn from four public school classrooms participated.

In analyzing the data, we were primarily interested in comparing children's detection of the two types of problems in their own texts and texts prepared by the experimenter. As a first step, each first draft was examined by two trained raters, working independently, for instances of these two problems. In all, raters found 34 texts with at least one instance of syntactic anomaly and 30 with some referential ambiguity (representing 49% and 43% of the total, respectively). A student was given credit for detecting a text problem if both raters agreed that anomalous or ambiguous portions of text had been altered during revision, regardless of whether the writer succeeded in correcting the problem. For example, if a child had changed the second text in Table 13.1 to:

> *One day a man left his house. Another man was standing outside. The man took out a letter and gave it to the other man. . . .*

that child would be credited with detection, despite the fact that the ambiguity was not corrected.

We had predicted that children would be more likely to detect syntactic anomalies than referential ambiguities in their own texts and this was strikingly confirmed. Of the 34 students producing syntactic anomaly, 18 (53%) managed to detect at least one anomaly during revision—not a high percentage, but one that indicates some level of skill. By contrast, of the 30 students producing referential ambiguity, only 5 (17%) managed to detect the problem. The difference between these percentages is statistically reliable ($z = 3.00$; $p < .01$).

These results are quite different from those obtained on the experimental texts. Here we found that of the 30 students making referential ambiguities, 22 (73%) detected at least one referential ambiguity in these texts and in all, managed to detect 57% of the total number of problems presented. Similar results were obtained from the 34 students producing syntactic anomalies: 30 (88%) managed to detect at least one anomaly in the experimental texts and over all, they managed to detect a total of 69% of

TABLE 13.1
Examples of Experimental Revision Texts

Single referent problems

Policemen sometimes have special jobs. Once there was a policeman who was supposed to chase robbers. One day he got into a policecar and drove to the city to catch a robber. They had a big fight. He was killed.

Double referent problems

One day a man left his house. Another man was standing outside. The man took out a letter and gave it to him. They talked for a while and then they got into a car. They were both policemen. They were going to catch a thief.

Syntactic anomaly

A man was going to the movies. Later was going to meet his wife. They were going to have a Chinese dinner and then take the subway home. But when the man got to the movies he saw that he had no money. He had left it at home.

these problems. Although the syntactic anomalies were somewhat easier to detect, the difference in the percentage of detected problems was not statistically reliable ($z = 1.71$; $p > .05$). Additionally, when we compare children's detection of problems in their own and another's text, we find that children were better at detecting both types of problems in another's text and these differences were highly reliable. (See Table 13.2.) Finally, we might also note that similar results were obtained with our sample of 40 fourth graders, although (as we might expect) scores on most measures tended to be somewhat lower.

Taken together, these results indicate that for children in this age range, both types of problems are substantially easier to detect in the texts of others than in their own. Nor does the difference seem due to any general reluctance on the part of these young writers to make changes in their first drafts. Of the fifth graders producing referential ambiguity, 57% made some text change during revision, whereas 53% of those making syntactic anomalies did so. These percentages are quite comparable to the 61% found for the sample as a whole. (Fourth graders were a little less likely to make changes: 49% of those producing a target text problem made some change, as compared with 56% for the sample as a whole.) Finally, we might note that very few children were able to detect referential ambiguities in their own texts. Since these same children were able to detect a fair percentage of comparable problems in the texts of others, it seems unlikely that the difficulty is due to some general lack of knowledge concerning ambiguity. Rather, this pattern of results suggests that the ability to detect ambiguity and (to a somewhat lesser extent) syntactic anomaly may require some additional skills. In the case of referential ambiguity, at least, this may include an ability to inhibit the use of privileged knowledge when reviewing text.

TABLE 13.2
Detection of Text Problems

Detection of referential ambiguities
$N = 30$

	Own text: Detects none	Own text: Detects at least one
Experimental texts		
Detects at least one	17	5
Detects none	8	0

$z = 4.13$, $p < .01$

Detection of syntactic anomalies
$N = 34$

	Own text: Detects none	Own text: Detects at least one
Experimental texts		
Detects at least one	15	15
Detects none	4	0

$z = 3.88$, $p < .01$

Contrary, then, to the conclusions of Bracewell *et al.*, it appears that children's revision difficulties are not simply due to some general inability to make rapid comparisons. Nor is it the case that, as these writers seem to imply, all text comparisons draw on roughly the same types of cognitive skills. Rather, it appears likely that different skills are involved, depending on the type of knowledge required and the circumstances under which that knowledge must be assembled.

Identification Processes

Under most circumstances, detection and identification of a text problem occur together, but as we have noted, there are undoubtedly times when students are aware that something is wrong with a text without being able to identify the difficulty. What a writer identifies will, of course, depend on how that writer conceptualizes the task of writing. Presumably, in setting out to compose a text, writers entertain some definition of the dimensions of the task—goals, strategies, skills, and knowledge that together constitute the range of things-to-be-done and things-that-can-go-wrong.

At present, very little can be said about the range of malfunctions that can be identified by students at various levels of development. Reports by Graves and his colleagues (Calkins, 1979; Graves, 1974, 1979) suggest that even very young beginners seem to identify problems at the level of text transcription and sentence syntax. The National Assessment of Educational Progress (1977) data suggest that elementary-age students are also able to identify problems of vocabulary choice, whereas some older students may also be able to identify problems relating to intersentence coherence (e.g., coreferencing and use of logical connectives). There is virtually no information concerning children's ability to identify structural problems at the paragraph or whole-text level, although current research concerning the structural properties of children's narratives and essays suggests that children show at least tacit appreciation of certain discourse features in their compositions (see discussion in Bartlett, 1979; in press).

Identification of problems need not involve an ability to name or define them. Indeed, there is no doubt that much revision is accomplished so swiftly that writers could not possibly have had a chance to articulate or reflect on the nature of the problem. Nonetheless, it is possible that the development of revision skill is accompanied by an increasing ability to articulate and reflect on specific text problems and that in fact development of new revision skills begins with an ability to reflect on a new type of problem.

Researchers have speculated on the mechanisms by which such abilities might be developed but, again, few data are available. Sinclair (1978) reports that surprising events—successes or failures—can sometimes trigger conscious awareness of relations in nonverbal tasks and she suggests that knowledge of success and failure may also aid in the development of awareness in language, with comments and questions from teachers and peers serving to provoke that knowledge. However, we might note that in Sinclair's research, conscious awareness was provoked at times when children were actively involved in trying to solve particular problems. Often, comments and questions about text reach a writer long after the immediate struggle to communicate is over and it is unclear how knowledge of success or failure will affect a problem solver once the immediate desire to solve the problem has "cooled off."

In any case, at the moment it seems reasonable to expect that students' skill in revision will be related to their skill in articulating various text problems and that this, in turn, will be related to their skill in articulating various plans and goals. For example, we might expect that students with better articulated initial text plans are also better able to identify text malfunctions in first-draft copy and similarly, that training in goal articulation might lead to more effective identification of first-draft problems. However, data to test these notions have yet to be collected, and they remain only intriguing hypotheses.

Correction Strategies

Success in correcting a text problem depends on adequate detection and identification processes. However, good detection and identification need not necessarily lead to an appropriate correction. Consider, for example, the ambiguity in this sentence and a fifth grader's attempt at revision:

ORIGINAL TEXT: *One day three boys went ice skating. He was showing off and he didn't see. . . .*

REVISION: *One day, David Bill and Harry went ice skating. The boy was showing off and he didn't see. . . .*

Clearly, the writer was able to identify the malfunctioning language even though he was unsuccessful in correcting it.

Choice of a revision strategy depends on many factors. No doubt a choice will reflect knowledge of the semantic and syntactic properties of a particular linguistic device together with knowledge of the effects of context on its use. Stylistic judgments will also play a large role in mature writers' choices. By contrast, beginners may lack knowledge of the full range of candidate devices for accomplishing a given function and may consequently rely on certain familiar devices regardless of their appropriateness in particular contexts. Additionally, students may make choices on the basis of other, more mechanical constraints. For example, we know from the observations of Graves, Calkins, and their colleagues that young elementary-age beginners have difficulty handling the physical mechanics of revision—erasing, inserting, making room, copying over. This suggests that these students are most likely to attempt only those changes involving a minimum of physical rearrangement. A need to reword text may also play an important role in their strategy choice: For instance, the rewording involved in inserting new material into existing text may be substantially greater than that required to delete, substitute or add new material to the end of a passage. Indeed, Calkins (n.d.) has observed that coherent integration of new content into ongoing text is one of the principal problems plaguing novice writers as they attempt to move from proofreading and the refining of text to revisions that involve more extensive reworking.

Questions of revision strategy have received virtually no attention in the existing literature and as a result, we know little about the range of solutions for various text problems available to children at different ages and levels of development. In an attempt to explore some possible factors in development, therefore, we have begun to investigate the range of children's solutions to problems of ambiguous coreferencing in narrative texts.

Generally, both child and adult writers accomplish coreferencing in narratives by using pronouns or by repeating an antecedent referring expression, as in the examples of Table 13.3. For example, analyses of referring

TABLE 13.3
Examples of Coreferencing Devices

Pronouns
One day a man went to the beach. The day was hot and he needed a cool swim.
Repetitions
Shortly after Christmas a young woman moved into the house. The young woman had few possessions and she settled in quickly.

expressions in about 900 narratives produced by 300 third through eighth graders indicate that 52% of the coreferencing is accomplished by pronouns and another 40% by repetition. Occasionally, however, these strategies will not work: Pronouns and repetitions fail to differentiate among referents and other strategies, such as those in Table 13.4, must be used. One question addressed by our current research concerns the types of solutions adopted by older elementary and junior high school students in these more unusual contexts.

In one study, we analyzed students' revisions of the set of eight experimental paragraphs described in Table 13.1. One hundred and twenty students participated, 20 above- and 20 below-average writers in each of grades five through seven. Of particular interest were their responses to the three double referent problems in Table 13.1, in which referents for two noun phrases were in doubt. We were curious to know how above- and below-average writers would cope with situations requiring more than the

TABLE 13.4
Examples of Referencing

Ambiguous coreferencing
One day two girls set out for the park. She had a bike...
One day two girls set out for the park. The girl had a bike...
Definite referencing through the addition of new information
One day two girls named Sandy and Karen went to the park.
Sandy had a bike...
One day two girls set out for the park. One was very athletic and the other hated sports. The athletic one had a bike...
Indefinite referencing
One day two girls went to the park. One had a bike...
One day two girls went to the park. They had a bike...

TABLE 13.5
Results of Experimental Revision Task: Percentage total problems

	Above-average writers		Below-average writers	
	Detected	Corrected	Detected	Corrected
Grade level				
Fifth	62%	17%	37%	06%
Sixth	72%	32%	57%	17%
Seventh	75%	36%	59%	21%

usual referencing strategies. Hence we designed texts where neither pronouns nor repetitions of antecedent referring expressions (e.g., *a man, another man*) would accomplish unambiguous referencing in these contexts.

When we examined students' attempts to revise these paragraphs, we found that students were fairly good at detecting the double-referent ambiguities, although they had considerable difficulty correcting them. As we might expect, above-average writers were more successful in their attempts, but even so, the percentage of solutions was not high. (See Table 13.5.)

Writers can correct these ambiguities by adding new differentiating information, by resorting to some type of indefinite reference, or by deleting the ambiguous sentence altogether. The range of solution types actually adopted is presented in Table 13.6.

As we can see, below-average writers were somewhat more likely to solve these problems by avoiding definite reference but the distribution of nondefinite and definite solution types did not differ significantly in the

TABLE 13.6
Distribution of Solution Types: Percentage of Total Solutions

Definite reference	Above-average writers	Below-average writers
1. Adding descriptive information		
a) about both referents	33%	09%
b) about one referent	10%	41%
2. Naming characters	29%	05%
Total definite reference	72%	55%
Nondefinite reference		
1. Indefinite noun phrases	23%	27%
2. Plural noun phrases	06%	18%
Total nondefinite reference	29%	45%

two groups ($\chi^2 = 1.91$; $df = 1$; $p > .05$). On the whole, when below-average writers attempted to construct a definite reference, they did so by adding new information about only one of the referents in question; whereas above-average writers tended to characterize both, either by giving them names or by providing descriptive information. It is possible that preference for this strategy by below-average writers reflects their difficulties in integrating new information into ongoing texts, with these students preferring to integrate only minimal amounts. However, given the relatively small number of solutions (particularly by the below-average writers) these differences may prove to be artifactual. For the moment it is probably best to conclude that when above- and below-average writers do manage to solve these problems, they seem to draw on a comparable range of strategies.[1]

Perhaps even more interesting than students' successful strategies, however, are their unsuccessful attempts since these are likely to provide information about earlier phases of skill development. As we can see from Table 13.5, more than half of students' correction attempts proved unsuccessful; this was true at all skill and grade levels.

Generally, when children failed, their failures involved some attempt to use the familiar strategy of repeating an antecedent noun phrase. For example, consider these attempts to revise the double referent text in Table 13.1:

One day a man left his house. Another man was standing outside. The man took out a letter and gave it to the other man....

... The other man took out a letter and gave it to him....

... The other man took out a letter and gave it to the other man....

It seems likely that the choice of *other man* represents some attempt to repeat the antecedent *another man*, without regard for the fact that *other* generally requires contexts in which alternatives are clearly designated. Overall, about 60% of children's poor solutions could be characterized in this way.

Another 25% involved recopyings of miscellaneous antecedent information that also failed to differentiate among characters. For example:

[1]When a group of 20 graduate-student adult controls attempted to solve these problems, their solution strategies showed a similar distribution, indicating that the strategies adopted by our elementary and junior high school samples are fairly adult-like in their range. Distribution of Solution Types Adult and Child Subjects Percentage Total Solutions

	Adult controls	Above-average students	Below-average students
Definite reference	75%	72%	55%
Nondefinite reference	25%	28%	45%

... The man that was standing outside took out a letter and gave it to the other man....

... The man that was standing outside took out a letter and gave it to the other man outside....

Although these involve repetitions of antecedent wordings, the repetitions do not involve nouns and so may represent rudimentary attempts at differentiating among characters by supplying descriptive information.

At a somewhat more advanced level were attempts to introduce new information that failed primarily because the writer did not use the information in a differentiating way:

EXPERIMENTAL TEXT: *A boy lived on Elm Street. Another boy lived next door. The boy had a new bike and he wouldn't let the other boy ride it....*

STUDENT'S REVISION: *Joe lived on Elm Street. Another Joe lived next door. Joe had a new bike and he wouldn't let the other Joe ride it....*

STUDENT'S REVISION: *The boy had a new bike and wouldn't let anyone ride it....*

STUDENT'S REVISION: *Tommy had a new bike and wouldn't let him ride it....*

Attempts such as these accounted for the remaining 15% of children's poor solutions.

Children's difficulties are no doubt related to a number of factors, including the mechanics of physically inserting new material into text (see Graves, 1979). But one problem may have proved overwhelming: the task of integrating information regarding the contexts of two ambiguous noun phrases. Scardamalia (in press) has suggested that elementary students have particular difficulty integrating information about two discrete ideas into a single coherent text. Using similar arguments, we might propose that students' difficulties are due in large part to their difficulties generating and coordinating information about two sets of ambiguous noun phrases.

This possibility was assessed in another study, in which students revised six double referent problems, identical in referential structure but differing in the amount of potential differentiating information available in their contexts. Three problems, identical to those of the first study, provided no differentiating information whereas three others provided information about character names which could readily serve to differentiate the two (Table 13.7). Thirty-nine children participated, 20 sixth and 19 seventh graders.

The results are clear cut. Of the texts containing potential disambiguating information, 62% of the problems were detected and of these, 95% were successfully corrected. As we might expect, these correct solutions almost invariably involved a strategy of repeating the character names. Of the texts without disambiguating information, 52% of the problems were detected but of these, only 55% were successfully corrected. (Analyses of variance for the detection data show a main effect for grade ($F(1,35)$ =

TABLE 13.7
Examples of Experimental Texts

With differentiating context information
A girl named Linda lived on State Street. Another girl named Jane lived next door. The girl had a new sled and wouldn't let her ride it. They argued about it for a long time. Finally, they agreed to share the sled. After that they became best friends.
Without differentiating context information
A boy lived on Elm Street. Another boy lived next door. The boy had a new bike and wouldn't let him ride it. They had a big fight about it. They were so mad they didn't speak for a whole week. They should have shared that bike!

6.6966, $p = .014$) but none for problem type and no interactions. Analyses of variance for the correct solution data show main effects for grade ($F(1,35) = 10.8875$, $p = .002$) and problem type ($F(1,35) = 16.389$, $p < .0001$) with no interactions.

The point, then, is that while these children were able to recognize and use disambiguating information when it was provided in a text, they had considerable difficulty generating the same type of disambiguating information on their own. The difficulty is all the more striking when we realize that children worked on both types of problems in a single session and might have adopted our use of named characters as a model for solving referential problems in the texts without character names. That so few apparently did this suggests that the tasks of generating and recognizing disambiguating information draw on rather different sets of skills.

CONCLUDING COMMENTS

The main points of our discussion can be briefly summarized. We began with the observation that revision involves detection skills as well as knowledge of how text works to convey an intended meaning. We noted that detection involves comparison and that text problems may be more or less easy to detect, depending on the ease with which a segment of text and potential alternatives can be represented. In some cases, representation of alternatives may be highly automatic but in others, considerable effort may be required. We noted, also, that comparison may be more or less difficult, depending on the extent to which evaluation requires some monitoring or alteration of normal interpretive activity. In particular, we demonstrated that some text problems may be more readily detected in texts composed by others than in one's own.

We also noted that effective revision depends on effective correction strategies and that generation of effective strategies is likely to depend on a number of factors. For elementary students, at least, choice is likely to depend less on the constraints of a particular context than on the ease with which a strategy can be executed, particularly on the amount of physical text rearrangement and content integration required. This does not mean that elementary students ignore the effects of context altogether. Indeed, children in our studies were able to detect text problems that they could not correct, indicating that some knowledge of context constraints—or at least their violation—was available for detection purposes. However, these same constraints often appeared to be ignored when children generated their corrections. Among other things, this suggests that knowledge available to comprehension and detection processes need not be equally accessible for production and correction and raises important questions about the special task requirements of each.

We have emphasized differences between normal processes of text comprehension and processes of text review and error detection, pointing out that the two draw on rather different interpretive activities. In particular, we have suggested that in reviewing their own texts, authors must sometimes inhibit interpretive use of certain privileged information and we speculated that development of this skill may require development of fairly explicit knowledge concerning interpretive activities (e.g., inferring, expecting).

At this point, it is also important to emphasize certain differences between production of first-draft copy and text corrections. For one thing, corrections are generated in the context of an existing text and must be integrated into that textual environment. At the same time, corrections are generated in response to an awareness (however vague or explicit) that something is wrong or at least discrepant in that existing text. This suggests that skills and knowledge available for generation of first draft copy need not necessarily be available for use within the constraints of revision. We know little about how skills become available for use within the constraints of the revision task. It is tempting to speculate that the burden of accommodating language to the constraints of an existing text environment may foster explicit awareness of how text functions and conversely, that explicit knowledge is (initially, at least) required for meeting these various demands. At present, however, this remains only an interesting hypothesis. What is clear, however, is the fact that revision is a complex and difficult process, distinct from generation of first-draft text in its task demands and its development.

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Appendix E

Learning to Write:Some cognitive and linguistic components

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E.J.B.

Chapter 1

The Second "R"

Declining Competency

Children's ability to produce written discourse seems to be declining. The evidence comes from a number of sources. The National Assessment of Educational Progress, which conducts regular surveys of students' academic knowledge, reports a marked decline in children's writing skills in the four years between the 1969 and 1974 assessments (NAEP, 1975). Most recently, the New York State Board of Regents announced that four out of five eighth, ninth, and tenth graders (including those bound for college) failed or barely passed a new writing competency test which required only that they write a simple business letter and a 150-word composition (New York Times, September 10, 1977). More generally, even our most prestigious colleges are finding it necessary to set up writing clinics and other remedial programs, not just for "special" or low income students, but for students across the board. For example, Wheeler (1979) reports that nearly half the entering freshmen at the University of California, Berkeley, are required to take remedial writing courses while at the University of Michigan and the University of Georgia, remedial writing replaces the one term of freshman English common ten years ago.

Educators suggest a number of reasons for the decline. Increased television viewing is almost always mentioned, but there are other villains as well. Wheeler, for example, lays much of the blame on the testing industry, citing its extensive use of multiple choice items and its failure to require writing on major achievement, aptitude, and licensing examinations. There is no question that it is quicker and cheaper to score multiple choice items than individual essays, but the problem runs deeper than an industry's need to produce a reliable but cost-effective score.

These tests serve an important gatekeeping function in our society, determining who will go to college and professional school and who, after schooling, will be licensed to practice. Were these tests to require no reading or mathematics, we would surely dismiss them as inappropriate or trivial. That we continue to take them seriously, despite the fact that they require virtually no writing, is an important indication of our present ambivalence toward writing skill. On the one hand, we complain of poor writing in our workforce, but we are not sufficiently interested in insuring that these skills exist to insist that their assessment be part of our gatekeeping procedures.

Given our present ambivalence, it is not surprising to find a decline in our schools' commitment to writing. For instance, Graves (1981) notes that only ten to fifteen percent of the material in children's language arts texts and workbooks involves writing, a particularly striking figure when we realize that more than ninety percent of classroom instruction is

governed by these materials. Graves also cites data from a recent large survey of seventeen year olds who were asked to indicate how much writing they had done in all their courses during the previous six weeks. The results indicate that fifty percent had written only two or three pages (or about half a page per week), twelve percent had written only one short page, and thirteen percent had done no writing at all.

Graves cites other figures that reinforce this impression of a lack of commitment to writing. He notes that for every dollar spent on the teaching of writing, a hundred or more are spent on reading. Further: "Of exemplary programs in language chosen for recognition by the U. S. Office of Education in 1976, forty-six were in reading, only seven included any writing objectives at all and only one was designed for the specific development of writing abilities." (p. 12) Finally, he cites data from a survey of school superintendents who were asked to describe the minimum criteria used in interviewing candidates for an elementary teaching position. Seventy-eight percent thought that teachers should have a minimum of three courses in teaching of reading, but comparable criteria relating to writing were not necessary. In sum, today's children are likely to have had relatively little practice with many forms of written discourse. At the same time, given the current disregard of writing as a prerequisite for college and professional schools, individuals are likely to have little motivation for developing writing skills while elementary and high schools are likely to feel little commitment to foster them.

Given these conditions, it is no wonder that writing skill has been declining. Fortunately, however, the last two or three years have brought a growing awareness of the problem along with a resolve among many educators, parents, and business leaders to do something about it. Declines in writing scores are beginning to make headlines. Articles and books about a "writing crisis" are beginning to appear (see, for example, New York Times, September 18, 1979). School superintendents are beginning to call for "crash programs." Funding for research is becoming available. Writing is assuming more importance as a topic at educational conferences.

Although the problem of declining writing is a complicated one, the success of any attempt to halt this decline ultimately will depend on our instructional efforts. These need not take place in school settings; one can envision, for example, writing instruction as part of on-the-job training or other adult education efforts. In the end, however, it is the effectiveness of our instruction, no matter where it is delivered, that will make the difference.

One of the principal obstacles to the development of more effective instructional programs is ambiguity about the processes which enter into writing. Cognitive and linguistic explanations for writers' problems are generally adduced on an ad hoc basis, and remedies are all too often suggested without any serious attempt to formulate a coherent picture of what it is that writers must actually learn to do. For example, a recent writing assessment noted that many children had difficulty establishing a coherent voice in their narrative writings. Although the problem could be related to a number of underlying cognitive or linguistic difficulties (difficulties in establishing referential cohesion, for example), the researchers somewhat arbitrarily asserted that the principal problem concerned children's inability to imagine events from another's point of view and advised teachers to engage children in a series of role-play exercises. It is plausible that role-play will help children develop more flexible imaginations and it is even possible that increased flexibility may make some contribution to children's ability to establish a consistent narrative voice, but the link between role play and text construction is hardly simple or straightforward.

Construction of written text is a highly complex and difficult activity, requiring skilled integration of many different linguistic and cognitive processes. Problems may develop at any stage and, indeed, it is possible that similar-seeming errors are the result of very different underlying difficulties. For teachers and researchers concerned with diagnosis and remediation (as well as the evaluation of a burgeoning number of claims about writing instruction) it is crucial to begin to differentiate some of these processes in order to begin to assess their potential contributions to growth in writing.

A Definition

Writing is a complicated business, involving writers, readers, and some shared knowledge of language. It can be defined in any number of ways. Some view it chiefly in terms of its affect on the writer: an excellent way for students to achieve an identity or master new information or explore the intricacies of language. For example: "Writing...is inherently a learning activity in which experience is translated in special ways into terms the writer can understand and store for use. People...can evaluate a child's writing in terms of the degree to which his attempt to write is enabled him to shape, control and thus understand something previously beyond his grasp." (Brown, p.5)

Although the act of writing may have these and other benefits for a writer, for our present purposes we will consider writing primarily as an act of communication. People do, of course, engage in writing without any particular intent to communicate with others: they make lists and reminders, they keep diaries, and so forth. But for our present discussion, we will be concerned almost entirely with writings that are ultimately intended to be read by others. To communicate effectively, a writer must choose language that enables a reader to achieve an intended interpretation. In a sense, we can say that the language provides a reader with a set of instructions for constructing his or her interpretation and these will be good or bad, depending on whether they enable a reader to integrate information from the text efficiently, unambiguously, and appropriately.

Some Components of Writing Skill

Writing begins with an intent to accomplish something and these intentions are of two sorts. On the one hand, we write in order to have some intended effect on our readers. At the same time, we write in order to produce a certain type of artifact. These can be amazingly intricate in structure (e.g., novels or haiku) or fairly simple (e.g., personal letters or memos). In any case, a writer must manage to keep both intentions in mind while grappling with the problem of turning these intentions into words. The actual selection of syntax and wording will be constrained by a number of different considerations. Ideas for content must be shaped to a syntactic structure, with elements formulated into subjects and predicates. At the same time, wordings must be chosen that will enable readers to link the incoming information to what they already know about the text.

Generally, we can say that writers must manage to juggle two sorts of tasks: on the one hand, they must maintain some consistent overall plan for a discourse, which guides the selection and arrangement of potential content. On the other hand, they must simultaneously cope with the on-going problem of turning that potential content into coherent, unambiguous text. It is clear that to accomplish this, writers must draw on an enormous range of skills and knowledge. For example, consider this science report by a six year old. The topic is volcanoes and the text is concerned with the youngster's knowledge both of volcanoes and of how to make volcano models:

(page 1) Wute* is a volkcano?
a mawtin that exploz fire.

(page 2) Wute is a sleeping volkcano?
a volkcano that exploz and duzint.

(page 3) Wute is a ded volkcano?
a volcano that nevr exploz.

(page 4) Wher is a irel** volkano?
in hwie!

(page 5) How to make a volkcano?
1 shap it out uf clay.

(page 6) 2 Put the lite in.
3 I panted it.
4 I shlaced it.***

Two things are immediately evident: the younger writer is utilizing his knowledge of volcanoes and volcano model-building, and he is also utilizing a recognizable question-and-answer discourse plan that involves an impersonal third-person account of volcanoes and a non-anecdotal impersonal account of how to make volcano models. At some point in the composing process he must have summoned up what was then only a potential content, based no doubt on what he had gleaned about volcanoes from books, conversations with his teachers, a museum trip, and perhaps some television viewing. Additionally, he must have recalled his own experiences constructing a volcano model in class. At the same time, he must have developed a plan for writing this down. Although the source of his plan may be a little difficult to specify, it is likely that the idea came in part from his understanding of the particular assignment (to write a science report) and his knowledge of how similar assignments had been carried out in this particular classroom before.

In any case, it is clear that a major part of the writer's task was to select from his knowledge of volcanoes information that could serve as potential content for the text and to transform that content into language which was consistent with his overall plan for the discourse. As we can see, he initially shows considerable skill in accomplishing this, but toward the end, he seems to lose track of the plan and drifts into an anecdotal first person account of his personal experience constructing volcano models. Why the discourse plan might have broken down at this particular point is a question that will be considered in detail in chapter 2. For now, I want to point out that one aspect of composing involves integrating topic with discourse plan and that at times this integration can be quite difficult for writers to achieve.

Integration of topic with discourse plan is only one of the problems facing a young writer. Consider, for example, the following by an eight year old. It was produced in response to a classroom assignment that asked the children to compose texts which followed the basic plan of a familiar and well-loved story, Remy Charlip's Fortunately (1964):

(title) A Trip to the Beach
A Fortunately Book

* I have retained the original spelling and punctuation in all children's texts.
** airel volkano? = a real volcano?
*** I shlaced it = I shellacked it.

(page 1) Fortunately he got a letter to go to the beach.
(page 2) Unfortunately he did not know where to go.
(page 3) Fortunately they came to pick him up.
(page 4) Unfortunately we got lost.
(page 5) Fortunately we found the beach.
(page 6) Unfortunately it was the wrong beach.
(page 7) Fortunately they desired to stay.
(page 8) Unfortunately they were kicked out.
(page 9) Fortunately they went home.
(page 10) Unfortunately they were speeding.
(page 11) Fortunately he let us go.
(page 12) Unfortunately we got lost on the way home.
(page 13) Fortunately we got home.

Here the simple discourse plan is successfully maintained as the writer consistently alternates contrastive single-sentence event descriptions. But another problem is immediately apparent: how is a reader to interpret the various pronouns? The author has supplied pictures which make possible a few interpretations, but even with the pictures most of the hes, was, and theys remain quite obscure.

These difficulties highlight another aspect of a writer's job: managing information so that a reader has sufficient context to interpret a particular piece of text. Sometimes, as in the preceeding example, the needed information for contextualizing is never provided. The reader is simply left with a sprinkling of unidentifiable pronouns.

In other cases, the problem seems to be more a matter of timing: a reader gets the information, but it comes well after it is needed. As an example, consider this text by another eight year old, composed in response to a researcher's request to write a story about a set of pictures:

> Once upon a time three boys were going to ice skate One of them fell thru a hole in the ice The two boys helped the boy up. Then the boys went home. There name was Bob and Joe and Pete Pete fell thru The end.

Even without additional information, a reader can make some sense of the third sentence; however, prior introduction of names would have provided some definite referents for the nouns and enabled the writer to avoid the somewhat vague and awkward the boy. Apparently the writer felt this as well, for she eventually added this extra information. Unfortunately, the addition comes well after the reader has struggled to make sense of the awkward bit of text.

The point is that writers must integrate considerations of topic and discourse plan with necessary and appropriate interpretive contexts. Once again, it is important to stress that considerations governing the use of an overall discourse plan may be quite separate from those governing the construction of more local interpretative contexts, as the Fortunately book example demonstrates.

Of course these are only some of the considerations that writers must attempt to integrate during composition of text. Along with selecting and organizing information, writers must also cope with problems of wording. At every point, a potential content must be cast in the form of some syntactic structure. Specific words must be chosen, and these must eventually be transcribed, a process that involves (among other things) spelling, punctuation, and handwriting.

In short, we can view writing as a complicated four-pronged task. On the one hand, a writer must sustain and carry out some overall discourse

plan, which guides the selection and organization of potential content. At the same time, a writer must select wording that transforms potential content into a coherent, unambiguous text. Then text must be transcribed. And throughout, writers must cope with the formidable problem of integrating and orchestrating the many subtasks and procedures involved.

The Purpose of This Paper

The purpose of this paper is to describe how some of these aspects of writing might be acquired and to indicate in a general way what teachers might do to facilitate acquisition. My intention here is not so much to review the developmental literature as to describe the results of a few studies that address certain basic developmental questions and that do so in ways having important implications for writing instruction. My selections have been guided by two considerations.

First, it seemed to me that the heart of the writing process lies in the act of composing, of assembling potential content and transforming it into coherent text, and so my focus has been primarily on these two aspects of writing skill. Unfortunately, this means that I have largely ignored the important problem of transcription. The reader interested in this aspect of writing development should consult Marie Clay's fine report of the development of transcription skills in very young writers (1975) as well as the excellent research concerning children's knowledge of spelling-sound relations by Read (1978) and Chomsky (1979).

Second, it seemed important to focus the discussion on the development of basic level skills, since these form the foundation for all further development in writing. At one point, I had considered including research on the development of these skills in adult writers, but a reading of Mina Shaughnessy's pioneering discussion of basic level college writing (1977) convinced me that I could add nothing to her insightful account. It seems most useful, therefore, to focus on research concerning the development of basic skills during the elementary and junior high school years.

The discussion in this piece emphasizes the point that writing, like many other problem-solving activities, is both an ad hoc and a patterned kind of activity. On the one hand, there is the obvious fact that each new composition represents a new solution to the problem of content organization and wording; on the other, there is the view that much of what writers do comes from their knowledge of conventional patterns of text construction. Given this framework, I will argue that the goals of a writing curriculum must include the development of both ad hoc strategies and conventional knowledge and that in implementing such a curriculum, two sorts of strategies will prove useful. One strategy supposes that beginners will become better at solving composing problems if their assignments and discussions are organized around the structural and functional properties of text. The other supposes that young writers will benefit from activities designed to make these properties available for conscious reflection and articulation.

These points are stressed both in connection with the development of overall plans for a discourse (chapter 2) and the development of skill in transforming those plans into text (chapter 3). The argument is then extended to a discussion of the development of skill in organizing and integrating composing tasks (chapter 4) and a summary of the implications of these discussions for writing instruction (chapter 5).

Chapter 2

Text Concept & Discourse Plans

Concepts and Plans

What is meant by the claim that writers work within the framework of a discourse plan? What are the elements of such a plan? How are they learned? We can begin by noting that writers generally approach their task with some intention to produce a text of a certain genre or type: e.g., a business letter, an editorial, or a recipe. In a sense, we can say that a writer thinks about the task in terms of some notion which he or she holds about the nature of the finished text. These include notions about appropriate content, about its arrangement, and perhaps about its wording. For example, by intending to compose a recipe, a writer has essentially called to mind certain aspects of content and wording of the finished text. That is, it will consist of two distinct parts (a list of ingredients and a list of procedures for preparing and combining these into some edible product); ingredients and procedures will be arranged in an order-of-use sequence; and information about ingredients will be worded as a series of noun phrases while procedures will occur as imperative sentences.

The point is that in planning to produce discourse of a certain type, writers can call to mind certain features of the to-be-composed text, even before the actual writing begins. Essentially, we can say that such knowledge provides a writer with a kind of ready-made plan for making a number of decisions. It can be a powerful aid in assembling potential content, and it can also help in the selection of syntactic structures and vocabulary.

How Knowledge of Text Develops

Most of the current research on the development of text concepts and plans has focused on the way in which children's knowledge of different types of text changes during the school years and, particularly, on the sequence in which different aspects of a text seem to be acquired. For the most part, these efforts have focused on the development of narrative and expository forms that tend to be rather lengthy and complex. Development of children's knowledge of other relatively compact or simple forms (e.g., recipes, personal letters) as well as forms with highly repetitive, predictable surface structures (e.g., riddles, limericks, knock-knock jokes) have received much less attention.

Data from research on narratives suggest that while some initial learning seems to occur fairly early, knowledge of these forms continues to

develop rather slowly throughout the elementary and junior high school years. Thus, we find that by the age of five or six, most children will have developed some knowledge of basic narrative plot structure: their dictated stories will tend to have recognizable protagonists and to be organized around simple conflicts or problems and their resolutions. In addition, by the age of about five, most children will have acquired some knowledge of conventional storytelling language. For example, they are likely to use the introducer "Once upon a time..." and occasionally, the ending marker "...and they lived happily ever after." Although these basic elements appear to be incorporated into many of their early stories, other important narrative elements only begin to occur during the later elementary years. For example, explicit information about characters' motives, plans, and reactions are not routinely incorporated into story writing until the fifth or sixth grades. Similarly, while younger elementary age children are well able to provide coherent descriptions of story actions, it is not until the later elementary and junior high school years that writers routinely begin to add supporting details that enable a reader to envision more precisely how an event occurred (see for example, the discussion of narrative development in Bartlett, 1979).

The resulting text differences are readily apparent in the following two stories, composed by a third and a sixth grader. They were elicited by a researcher as part of a study of narrative development in third through seventh graders and are quite typical of the responses obtained from the more skilled writers at their respective grade levels. In each case, the children were asked to write a story about the same seven-panel cartoon:

Third grader's text: Once upon a time there were three boys Mo, Larry, Curly. They were Ice skating and Curly, the dum-dum went into the thin ice. He fell in the water trying to keep himself up. Larry & Mo went to a tree, pulled off a branch and Curly, the do-do gripped and Larry & Mo pulled him up & They lived happily ever after.

Sixth grader's text: It was a crisp, cold day and six boys had just finished a hocky game. Three went home but Henry, Mike and Robby stayed

Robby's team had won and he was being very smug about it. Henry and Mike were disgusted at the way Robby was acting and were trying to ignore him.

Suddenly they heard a loud crack & saw Robby falling. They forgot that they had been mad at Robby: now they were just scared.

"Robby we'll help you!" said a desperate Henry.

Quickly Henry and Mike skated to the nearest tree. They broke off a branch and went back to Robby. But when they tried to pull him out with it, the branch broke.

"Hey guys you better help me quick! My legs are beginning to fell numb!" said Robby in a rasping voice.

Mike had a good idea. He remembered the hockey sticks that were across the lake. He got one and together he and Henry pulled Robby out. Robby was cold but they were happy that he was still alive.

The third grader provides a coherent account of the action, along with a few narrative embellishments: for example, he gives the characters names. Conventional narrative language is also used to open and close the story. At the same time, the writer provides only a rudimentary motivational

structure (i.e., Curly falls in because he is dumb) and makes no attempt to characterize the circumstances surrounding the main events. By contrast, the sixth grader's story offers a rich motivational structure along with a fairly detailed account of the way in which events occur, including an account of some of the actual words uttered. The writer tells something about the events that preceded the main action and gives a number of descriptive details about what things looked like, how they sounded. Furthermore, he gives explicit information about how the boys felt, how their feelings changed, and how their feelings resulted in various actions. The point is not simply that older writers write longer or more complicated texts, but the older writers include a wider range of narrative information. Given the differences, we might speculate that the older writer draws on a more elaborate concept of what constitutes a story.

Data on expository writing suggest an even lengthier period of basic development that extends into high school and college. Although few details are as yet available, it is clear from the work of Scardamalia, Bereiter, and their colleagues that most elementary and junior high school students are still very much in the process of acquiring even the most rudimentary features (Scardamalia, in press; Bereiter, Scardamalia and Turkish, n.d.,; Hidi and Hillyard, n.d.). Scardamalia notes that writers in this age range have difficulty integrating ideas into some of the usual expository frameworks, and her examples indicate that they have difficulty constructing generalization-plus-example plans or causal sequences of thesis-antithesis integrations. Consider these attempts to formulate an argument in response to the question: "Should students be able to choose what things they study in school?":

> Text One: In School We should Be Able To Do Any Kind of We Want To Do We Are Free We Could Do Anything We Want God Us Free We Could Do Anything we Want To Do I'd Like Spelling And Math In School We Should Do It Any Time We Want. (Scardamalia, in press, ms. p.11)

> Text Two: Should children choosen what they want to study on? Do you think children should choose what they want for social studies? I do. Because, would you like to study on something you don't like? Would you like to study on Brazil or Peru? Would you like to study on these countries?! Or other countries that are almost unknown to mankind? No. Not I. Who would suffer? We would if we had to study on countries like Brazil and Peru? No! We would only find half as much as is known to man! No! We shall not suffer on this case!! No we won't....(Ibid., pp. 14, 15)

> Text Three: Should Students be able to choose what they study in school.
> Students are very sneeky and lazy. Most children would probably choose recess all the time but I still think that it is good.
> Only is it good though, if the subjects are limited to 4 or 6 things such as Reading, Math, Social Studies, Science, art or French. The students though would probably all ways pick art and not get work done. (Ibid., pp.16, 17)

In the first text, as Scardamalia notes, the student's response is to reiterate a single idea, that students should be free. In the second, the writer appears to be constructing a generalization (that the present school curriculum is inadequate) along with some supporting evidence, but the relation between the two remains somewhat vague. In any case, the writer seems unable to move his argument beyond the simple repetition of a single

example. In the third text, the writer is presumably attempting to integrate two notions into a thesis-antithesis contrast (it would be nice to choose courses, but students are lazy), but the contradiction between the two notions is never integrated or resolved.

Scardamalia claims that these texts are typical of attempts by children in the upper elementary and junior high school age range and points out that they are less successful than their children's narratives (see also Bereiter, Scardamalia and Turkish as well as Hidi and Hillyard). She suggests that the slower development of expository forms may be due in large part to the cognitive complexity inherent in their logical structures and claims that students in this age range may have difficulty integrating two or more ideas into a logically consistent whole. While this may be true, it may also be the case that students in this age range have had very limited exposure to examples of these forms and, as a result, have had little opportunity to develop appropriate text concepts or models. With more exposure, the rate of development might begin to approximate that of narrative texts.

While it is clear that children's narratives (if not their expository texts) become increasingly more elaborate and complex during the elementary and junior high school years, we know very little as yet about the details of these changes. Longitudinal data would be especially valuable here, but as far as I know, only one such study exists. Its results, which are quite intriguing, suggest that changes seem to involve very gradual and subtle transformations of existing text concepts, concepts which basically remain quite stable and consistent over long periods of time.

The data, reported in a study by Waters (1980), consist of 120 "class news" reports composed by one second grader in the course of a school year. At the beginning of the year, the teacher provided a few instructions concerning the type of material that the children might include, but beyond this, the children were free to determine the content and organization of their own individual texts. Here are some examples taken from texts compared at the beginning, middle, and end of the school year:

> Early school year: Today is Tuesday, September 25, 1956. It is a sunny day. We are glad.
>
> We went to music this morning. It was fun. Tomorrow the doctor shall look at us. We shall also have assembly.
>
> Mid school year: Today is Tuesday, January 22, 1957. It is a foggy day. We must be careful crossing the road.
>
> This morning we had music. We learned a new song.
>
> Linda is absent. We hope she comes back soon.
>
> We had arithmetic. We made believe that we were buying candy. We had fun.
>
> We work in our English work books. We learned when to use is and are.
>
> Late school year: Today is Monday, May 27, 1957. It is a warm, cloudy day. We hope the sun comes out.
>
> This afternoon we had music. We enjoyed it. We went out to play.
>
> Carole is absent. We hope she comes back soon.
>
> We had a spelling lesson. We learned about a dozen.
>
> Tomorrow we shall have show and tell.
>
> Some of us have spelling sentences to do for homework.
>
> Danny brought in a cocoon. It will turn into a butterfly.
>
> (Waters, pp. 155, 157, 159)

It is evident that [illegible] three texts have many features in common. Each begins with the da[illegible], a description of the weather, and some evaluative comment or reactio[illegible]. This is followed by descriptions of present and future class activities or news about peers, again often followed by some evaluative response that indicates the significance of the event to the writer. In fact, so similar are the texts that Waters found she could characterize their content and its organization in terms of only a very few simple notions or writing "rules." Indeed, she needed only six such rules to characterize the texts written during the first few months of the year and no more than thirteen for the final ones. Moreover, these rules were remarkably inclusive, accounting for between 91 and 98 percent of the text produced.

In all, Waters constructed three spearate rule systems (or "grammars") to account for texts produced in the beginning, middle, and end of the year. Here is the system constructed to account for the early texts:

"Class news" grammar rules, September

(1) Class news → * Day + Activities
* The symbol → means "can be rewritten as" or more informally, "consists of".
(2) Day → Date + Weather
(3) Weather → Description + Response to Description
(4) Description → Description 1 + (Description 2)**
** Item in parentheses are optional.
(5) Activities → Activity 1 + (Activity 2)
(6) Activity (n) → Statement of Activity + (Specify Account) + (Time of Day) + (Response to Activity)
(Waters 155)

Interestingly, Waters found that in constructing each successive rule system, she was able to include all of the rules required by the preceding system. Often the new version of a rule would be more elaborate, applying to a greater variety of information and arranging it in a somewhat more complicated way. The fact that old rules were readily incorporated into the new rule system indicates that the texts could be characterized in terms of a consistent system that was apparently maintained across a full year's time.

Two things can be concluded from this study. First, the data suggest that this student was composing in terms of a very stable and well-specified notion of what constitutes a "class news" report. Moreover, the fact that changes seemed to involve gradual adaptations of old structures, rather than abrupt introductions of new, suggests that the composing was basically a conservative activity and that this youngster approached the problem of constructing new compositions by attempting to relate new situations - new combinations of topic and language - to previous solutions. In general, it seems as if this student was composing in terms of some consistent, well-formulated, and highly stable notions of the structural and linguistic properties of "class news" reports.

It can be argued, of course, that "class news" reports are very simple, circumscribed, and highly repetitive types of text and that individual children are less likely to exhibit this sort of structural consistency in their narrative and expository writings. However, it is not inconceivable that children who are learning to compose in these forms do in fact produce texts which exhibit similarly stable and consistent structural properties. Indeed, such consistency would provide strong evidence that learning had actually occurred.

In any event, writers who can rely on a well-formulated concept of a text have a number of advantages. For one thing, such knowledge provides a writer with a ready-made plan for generating potential content. If, for example, a writer thinks of a "class news" report as consisting of a sequence of types of information (e.g., information about the date, followed by a description of the weather, followed by information about a current class activity), the writer has in effect produced a workable plan of action for assembling some content (e.g., look at the calendar, glance out the window to observe the weather, look at the day's schedule to select an activity). At the same time, if a writer thinks of these structural features in terms of some formulaic or conventional language, then the writer has in effect produced a plan for the wording of whole segments of text (e.g., the notion of date may be represented in terms of a specific text format such as "Today is (name of day), (name of month), (day of month), (year)").

Of course these concepts cannot specify an entire text in advance, since each composition involves its own unique combination of topic and situation. This is as true of highly specified surface formats (e.g., riddles, knock-knock jokes, and perhaps "class news' reports) as it is of more complex forms, such as stories and essays. Writing must always involve some combination of ad hoc decision making as well as well-practiced, well-specified routines. With experience, however, the balance between the two may change. Initially, before a writer has had much experience with a given form, we would expect that writer to spend more time piecing together a potential content for that text than would be necessary once the form has become more familiar. One function of experience, then, is to enable a writer to begin to compose in terms of predictable, well-specified structures.

Tacit or Explicit Knowledge?

Adult writers generally are able to articulate their knowledge of text structure. Flower and Hayes (in press) have found that adult writers discuss their plans for text in terms of well-differentiated structural features: they speak of plans for constructing introductions, generalizations, examples, transitions, summaries, and so forth.

These researchers argue that one important mark of writing skill is the ability to articulate intentions in terms of well-defined text concepts and goals. This does not mean that writing always involves the articulation of explicit composing plans. In fact, there is no question that much of the writing process occurs at a tacit, intuitive level. Neither does it mean that the ability to articulate concepts and plans is a necessary prerequisite for good writing. Undoubtedly, there are some writers who can produce fine texts without being able to explain what they had in mind when they did it, but such writers are probably quite rare. For most of us, the development of skill in writing is accompanied by an increasing ability to articulate (and reflect on) well-defined goals and intentions. Indeed, this ability can be extremely useful. A writer with a well-articulated set of purposes can deliberately reinvoke these to sustain a consistent course of action during the many interruptions and shifts in attention that inevitably accompany composition. Similarly, well-articulated purposes are likely to make it easier for writers to identify errors and construct revision strategies.

Very little is known about the development of children's ability to articulate text concepts and plans. Given the adult data, we would expect to find a gradual increase in children's ability to articulate their text knowledge and a generally positive correlation between articulation and

composing skill (except perhaps at the earliest stages). Only a few studies exist, however, and their results are somewhat difficult to interpret. For example, Bereiter, Scardamalia, and Turkish (n.d.) compared the ability of some fourth and sixth graders to name or describe structural features of stories, descriptions, and essays with the actual presence of these features in the students' texts. They found no relation between the two measures, and in fact, naming turned out to be negatively correlated with production, indicating that the more features children produced, the fewer they actually named. However, as Bereiter, et al., point out, the data come from a working-class population where explicit discussions of various genres is not to be expected. When Bereiter, et al., replicated the study with middle class students, they found that many more features were named. While the data have not yet been fully analyzed, the preliminary results point to a greater congruence between the naming of features and those produced.

Skill in Maintaining Plans

Along with articulating their concepts and plans, writers must also develop skill in maintaining their plans during the difficult and often lengthy process of composition. We have already observed the breakdown of what appeared to be a well-formulated structural plan in one six year old's science report (page 4) and have speculated that the problem involved difficulty integrating the child's knowledge of the topic with the structuring of that topic required by the discourse plan. Although integrating knowledge of topic with an intended discourse plan can be a problem for writers at any age, it can be especially difficult for beginners to handle. Consider, for example, these attempts by two fourth graders. The texts, like the ones on page 8, were composed in response to a researcher's request to write a story about events pictured in a seven-panel cartoon. In each case, the writer adopted the clever strategy of giving one of the characters his own name. As we can see, each begins with a third person discourse structure and then drifts (for no apparent narrative reason) into a first person account, using the first person pronoun to refer to the character who has been given the author's name:

> Text one: (author's name is Danny): One day there were three boys Danny, Keith and Megha. Keith was skating too fast and he bumped into Megha and Megha fell into the ice. Me and Keith got a branch off a tree. We took the branch but it fell apart. Me and Keith went to find something and we found a hockey stick and pulled Megha out.

> Text two: (author's name is Chris): One winter day a boy named John called his friends Peter and Chris he said do you want to go ice skating with me they said when now okay we will meet at the pone.
>
> Then they got there we were playing hockey at first then we were just ice skating then Peter cracked the ice and fell in but not all the way Chris got a piece of a branch and pulled him out.

Inadvertently these writers may have created for themselves a rather difficult organizational task. While the discourse plan may have called for the story to be told from an impersonal, third person point of view, the use of a character having the author's own name may have led the author to forget that the character with his own name was not, in fact, representing himself. This consequently may have led him to adopt the anecdotal, first person point of view customarily associated with narrative accounts of events in which the storyteller himself participates.

It would be interesting to speculate about why these shifts in discourse occur. For example, it may be that under certain circumstances the task of integrating a potential content with a potential discourse plan is extremely difficult. One such situation may occur when a writer is attempting to cast a description of a personally experienced event into an impersonal third-person discourse structure. A writer able to maintain a firm concept of such a structure may have relatively little difficulty integrating the two, but if the text concept or plan is diffuse or fragile, then the initial discourse plan may eventually drift into one more compatible with the way in which the potential content is ordinarily perceived.

We might speculate then that a writer may have difficulty maintaining a discourse plan if its structure or point of view differs substantially from that in which its potential content is usually apprehended. Under such circumstances, we would predict a drift in the organization of text toward the more familiar structure or point of view.* It is interesting to note that of the eleven fourth and fifth graders who attempted such an organization, all but three (one fourth and two fifth graders) were unable to maintain it throughout the discourse. In contrast, of the nine sixth and seventh graders adopting such a plan, all but one were able to maintain it consistently.

Implications for Instruction

To summarize, I have argued that development of skill in writing any particular type of text consists in part of an increasing ability to represent that text in terms of its structural features and to compose in terms of these features. This does not mean that skilled writers need deliberately invoke these features during composition. It does mean, however, that with experience these features generally become more differentiated and at least potentially available for conscious reflection. At the same time, it also means that with experience, writers become increasingly able to maintain these structural representations in the face of the many interruptions and conflicting organizations inherent in the composing process.

How then might teachers foster the development of these skills and concepts? It seems to me that several types of experiences would be helpful. For one thing, students can gain enormously from reading in the various text forms, but the reading must be from a writer's point of view. In this approach, students consider texts in terms of their structural features, attempting to reconstruct the decisions that a writer might have made in assembling the content and finding appropriate words. Young, Becker, and Pike's composition text (1970) provides an example of what I have in mind. Although intended for college expository writing classes, the approach could easily be adapted for use with younger students and in other forms of discourse. Teachers of elementary age children may find that highly simple, patterned texts such as folk tales and fables are particularly useful in heightening their students' awareness of structural pattern. Awareness may also be heightened if beginning writers are given opportunities to try their hands at composing in some of the more highly patterned narrative and expository formats (e.g., the "fortunately...unfortunately..." format of the text on page 5).

*Our examples have dealt primarily with problems in establishing narrative voice, but one would predict similar problems in cases where authors attempt to adopt a time sequence (e.g., a flashback) that does not reflect the sequence in which the writer normally experiences the particular events.

Apart from reading and format practice, beginners may also benefit from occasional guided practice investigating new forms. Such experiences would foster an awareness of strategies by which new forms can be learned and old forms adapted to meet new situations. For example, elementary age children can be given the problem of composing a business letter, a letter of recommendation, a set of instructions for a game, or any other unfamiliar, short, and fairly patterned type of text. After students have reached some consensus concerning the type of information to be included, they can set about the task of composing. Structures and resulting language can be discussed and compared with conventional texts. Similarly, students can be given the task of adapting a familiar "near enough" text (e.g., a recipe) to a new communicative situation (e.g., the need to compose instructions for a game). Resulting texts can be discussed in terms of the way old structures have been adapted to suit new information needs.

As we have noted, some forms of organization may be more difficult to maintain than others, depending on the relation between topic and text structure. Particularly difficult are those situations in which personal experiences are to be conveyed in an impersonal structure. Practice with some of these difficult combinations may be useful in helping writers become more aware of structural inconsistencies and the situations in which these are likely to occur.

These are just a few suggestions. Their purpose is not to provide curriculum since the experienced teacher will be able to think of other activities that are far more appropriate, but to illustrate some of the directions in which curriculum to foster structural knowledge might develop. One of the essential ingredients of such a curriculum would be the clear articulation of structural properties together with considerable practice conceptualizing composing tasks in terms of these. This suggests that writing assignments be organized around structural units, with discussions and text evaluations focused on structural problems. For example, narrative writing assignments might be designed to focus students' attention on the development of particular text units, such as settings, conflicts, or resolutions. In any case, the goals of this part of a writing program would be threefold: to heighten students' awareness of the structural properties of various types of texts, to give students practice articulating their perceptions, and to help them elaborate and enlarge upon existing structural knowledge.

Chapter 3

Coherence & Wording

Constructing an Appropriate Wording

Although construction of an adequate discourse plan is important, writers must manage to cope with other aspects of composition as well. Crucial among these is the need to provide readers with information that can be readily interpreted. In interpreting texts, readers must keep track of incoming information and construct some coherent, organized representation of its meaning by linking up new information to old. Readers must be able to figure out referents for words, appropriate temporal organizations, points of view, and much more.

Writers can make that task more or less difficult, depending on their skill in communicating unambiguous information about how the elements in a text are to be fitted together. Consider, for example, this passage from a text by a fourth grader:

> ...He was exploring a cave when he heard something. He looked around and he saw a another man! (However *he* was in a dark corner so *he* couldn't hardly make out the figure.)... (emphasis mine)

As we can see, the antecedents of the two italicized pronouns are ambiguous and as a result, the reader is unable to complete the interpretation.

Ambiguity is only one type of problem. Often, writers produce wording that, while not outright ambiguous, is nonetheless misleading. Consider, for example, the italicized noun phrase in this fourth grader's text:

> One winter evening to people met on a dark corner. One of the people said, "Do you want to come over to my house?" "Yes," the *other man* said. The to men went home. They got home just in time... (emphasis mine)

The other man implies that there has been some prior mention of another man, but the conscientious reader would search for such a mention in vain. A bit of problem-solving might eventually lead a reader to interpret one of the people to mean "one man," but the text hardly makes this clear.

The reader faces even more serious difficulties in interpreting this fifth grader's text:

> Tom and Jerry were friends. They have a secret club house. Almost every evening they meet in a dark corner that was there club house. It was made out of wood they found. This is how they decided to make it. It was a winter evening (Tom and Jerry will never forget it) two people (Tom and Jerry) met. After words they found out that they were

in the same class and became best friends and decided that were they met that's were they put there club house and that's were it is.

The problem here is not so much in establishing appropriate referents as in working out an appropriate sequence of events. Past and present tenses are sprinkled inconsistently throughtout the first five sentences. The problem is then exacerbated when the writer introduces some background information in what appears to be a flashback, preceded by a passage in which the author steps outside of the narrative framework altogether to address the reader directly. The writer's plan is obviously a complicated and sophisticated one, which may account for the fact that the signals in the text are so difficult to follow.

Referential ambiguities and misleading wordings are fairly common in the texts of young writers. Data from our own studies of narratives composed by some 300 third through eighth graders indicate that about forty percent of the children at each grade level produce at least one ambiguity per text. In addition, about thirty-five percent produce at least one instance of misleading wording. Data from studies by Scardamalia, Bereiter, and their colleagues suggest that students have these problems with expository texts as well.

Detecting Text Problems

What kinds of skills are involved in producing interpretable, unambiguous text? For one thing, writers must be able to detect potential problems. They must be able to monitor their texts to make sure that information required for interpretation is actually available. This means that they must keep track of the information explicitly mentioned in a text and, perhaps even more important, come up with a reasonable estimate of what readers will be able to infer.

Writers therefore must be able to differentiate between information which they intended to convey and information actually available in a text. For example, a writer may know and intend to say that Sam Smith is the husband of Sue and the brother of Sarah, but if this information has not already been established in the discourse, then a phrase such as "her husband" or "her brother" will be difficult to interpret. Research by Piaget and his colleagues has demonstrated that elementary age children can have considerable difficulty making just this sort of differentiation (Piaget, 195). Typically, in circumstances where a child's knowledge or perspective differs from that of a listener, the child will fail to take these differences into account, proceeding instead as if the two shared the same knowledge. As Piaget noted, this sort of cognitive egocentrism can lead to a number of communication problems. Among other things, such egocentrism can make it extremely difficult for young writers to detect ambiguities and misleading wordings in their own discourse.

Knowledge of Cohesive Devices

In addition to detecting ambiguities, writers must also understand how language functions in different contexts to signal an interpretation. Consider, for example, the problem of signaling co-reference. English has a number of different devices for signaling that two noun phrases share the same referent, some of which are illustrated here:

Text one: One day an old woman arrived in the town. The old woman was carrying a heavy suitcase. She was tired.
Text two: Two girls were skating on the ice. The two had been playing hockey but now they were just fooling around.
Text three: My friend Nancy has a son. The child is five.

In each text, the italicized noun phrases share the same referent, with co-reference being signaled by the definite articles, lexical repetitions, and pronouns.

In choosing among the various devices, a writer must take account of the context and the set of potential referents from which the intended referent for a noun phrase is to be selected. As an example, consider a situation in which a writer wishes to designate a male as referent in a context which includes two males:

> One day two boys set out for the park. He had a bike...
> One day two boys set out for the park. The boy had a bike...

Here a pronoun will not suffice nor will a noun which has as its meaning only the information that the intended referent is a young male.

There are, however, a number of other ways in which referencing can be accomplished in this particular context. A writer can provide some additional background information about the two boys by giving them names or some sort of physical characteristics:

> One day two boys named Harvey and Frank set out for the park. Harvey had a bike...
>
> One day a fat boy and a skinny boy set out for the park. The fat boy had a bike...

Or a writer can take another tack and solve the problem by changing the basic content of the message. For example, a writer can simply abandon the intention to designate one of the characters and just say that an unspecified one of them (or both of them) brought the bike:

> One day two boys set out for the park. One had a bike and the other, a skateboard...
>
> One day two boys set out for the park. They had a bike....

The point, then, is that writers face two sorts of problems in constructing coherent, unambiguous text. They must be able to assess the information actually available to readers in a text, being careful to differentiate their own intent to inform the information actually transmitted. At the same time, they must be able to select linguistic devices that function in the existing context to convey the intended meaning.

Developing Skill in Detecting Text Inadequacies

Most teachers and researchers would agree that children acquire considerable skill in both aspects of text construction during the elementary and junior high school years. We are only now beginning to uncover some of the details. For example, although Piaget's research would lead us to imagine that elementary children might have considerable difficulty monitoring ambiguity in their own texts, data that assess such a notion are still relatively scarce. Studies by Bracewell, Bereiter, and Scardamalia (n.d.) and by Scardamalia, Bereiter, Gartshore, and Cattani (n.d.) suggest that elementary and high school students have difficulty revising their own texts, but these analyses fail to pinpoint the exact nature of the problem. For example, do children have difficulty revising all types of text problems or are some more difficult than others?

Answers to some of these questions are provided by data from a series of studies in our own laboratory. The data come from two sorts of revision tasks: in one, elementary age children were asked to revise short text com-

posed by the experimenter; in the other, children were asked to revise their own compositions. In both cases, texts were narratives, and in both, we were interested in children's skill in identifying and correcting syntactic and referential anomalies.

In one study we observed fifty-three children in four fifth grade classes. Each composed and later edited a short narrative for publication in a class anthology. In addition, a week after editing their own texts, children were asked to edit a series of eight short paragraphs composed by a researcher. Of these, six contained faulty referring expressions, and two, a missing subject or predicate. Here are some examples*:

> Text one: Policemen sometimes have special jobs. Once there was a policeman who was supposed to chase robbers. One day he got into a policecar and drove to the city to catch a robber. They had a big fight. He was killed.
>
> Text two: One day a man left his house. Another man was standing outside. The man took out a letter and gave it to him. They talked for a while and then they got into a car. They were both policemen. They were going to catch a thief.
>
> Text three: A man was going to the movies. Later was going to meet his wife. They were going to have a Chinese dinner and then take the subway home. But when the man got into the movies he saw he had no money. He had left it at home.

When we looked at the first drafts of children's compositions, we found a total of fifty-two ambiguous referring expressions and thirty sentences with missing subjects or predicates. In their revisions, the children attempted to change seventeen of the thirty sentences with missing subjects or predicates, but they apparently failed to notice the faulty referring expressions since they attempted to change only five of them. This is in marked contrast to their performance on our eight experimenter-prepared paragraphs, where we found no difference at all between their response to ambiguous referring expressions and missing subjects or predicates. Overall, children attempted to change about half of each type of text, averaging about 1.6 of the missing subjects and predicates and about 3.5 of the referring expressions.

This pattern of results has now been replicated with two other groups of fourth graders and another group of fifth graders. It suggests that for children in this age range, skill in detecting incoherent or ambiguous text depends in part on the situation and in part on the particular feature. Where referential features are concerned, children seem fairly skilled in detecting ambiguities in the texts of others but not in their own texts. This is in marked contrast to their skill in detecting certain other anomalies, where performance in the one situation seems roughly comparable to performance in the other. (Our data focused on missing subjects and predicates, but informal observations of other revisions in children's texts suggest that they are equally able to detect problems in subject-verb agreement and verb endings, as well as missing articles, prepositions, conjunctions, and auxiliaries.)

*We chose faulty pronouns, vague nouns, and missing subjects or predicates because these turned out to be the three most frequent types of anomalies observed in earlier studies of children's writing. In fact, the paragraphs of the editing task were adapted from texts actually produced by children in these earlier studies.

The point, then, is not that children have some general difficulty detecting text anomalies, but that they have a special difficulty detecting referential ambiguity in their own texts. Presumably, the difficulty arises in part from what Piaget has termed "egocentrism". Children may be unable to set aside their own intentions and view their compositions through a reader's perspective, bringing to its interpretation just the information actually available in the text. I will discuss the implications of these findings for writing instruction and assessment shortly. Before I do so, it will be useful to consider a second aspect of text skill: children's knowledge of the linguistic devices through which coherent text is constructed.

Learning about Cohesive Devices

Generally, by the time children are in the third or fourth grade, they seem to have acquired a good grasp of the principal linguistic devices for constructing coherent text: they can use pronouns and lexical repetitions to establish co-referencing; they can use adverbs and conjunctions to establish linkages among text elements; they can link elements together with relative clauses; and so forth. To be sure, there are some exceptions. For example, data cited in Palermo and Molfese (1972) suggest that full mastery of the co-referential properties of pronouns may not be achieved until children are well into junior high school and that elementary students may still be uncertain about the semantics of certain adverbs and conjunctions. Nevertheless, it is clear that elementary students have a good grasp of the basic syntactic and semantic properties of these devices. What is less clear is how children actually come to use them in constructing a wording for their texts: how they arrive at a particular device and the extent to which their language reflects a knowledge of or sensitivity to the constraints of the particular context.

As an example of what I have in mind, consider once again the problem of co-referencing. Generally, writers accomplish co-referencing by using a pronoun or by repeating some antecedent referring expression, as in the examples on page 17. This is true of adult writers and elementary students as well. For example, analyses of referring expressions in some 900 narratives, produced by 300 third through eighth graders, indicate that fifty-two percent of the co-referencing is accomplished via pronouns and another forty percent via a repetition of an antecedent expression (e.g., A woman went to the park. The woman was walking a dog.).

Occasionally, of course, these strategies won't work: pronouns and word repetitions will fail to differentiate among potential referents. To accomplish referencing in these circumstances, writers must adopt some other strategy. Most commonly, adult writers solve these problems by adding some new differentiating information to the text. (For example, the texts on page 17.) One important question is whether elementary children will do the same. Will they appreciate the fact that the success of a strategy depends on its context and will they adjust their strategies to reflect contextual constraints? The question was addressed in another series of studies in our laboratory. Once again, the data came from a revision task, this time involving only texts composed by an experimenter. Once again, the texts involved referential ambiguity, but this time instead of focusing on children's skill in detecting ambiguity, we were more interested in their strategies for fixing things up and in the effects of context on strategy selection.

The texts consisted of six short paragraphs of identical referential structure. In each, referents for two noun phrases were in doubt, one a definite noun phrase and the other a pronoun. (The referential structure

was, in fact, identical to the structure of text two, page 19.) Where the texts differed was in the amount of information available in the context for differentiating the two potential antecedents. In one case, differentiating information was available that could readily be used in constructing revised noun phrases. To do so, a writer needed only adopt the simple, familiar device of lexical repetition. For example:

> A girl named Linda lived on State Street. Another girl named Jane lived next door. The girl had a new sled and wouldn't let her ride on it. They argued about it for a long time. Finally, they agreed to share the sled. After that they became best friends.

To revise this text, a writer had only to copy the antecedent Linda and Jane, substituting them for the ambiguous the girl and her.

In the other cases, differentiating information was not available:

> A boy lived in Elm Street. Another boy lived next door. The boy had a new bike and wouldn't let him ride it. They had a big fight about it. They were so mad they didn't speak for a whole week. They should have shared that bike!

Here the antecedents consist of the noun phrases a boy and another boy, which if substituted for the boy and him would not differentiate between them. Thus, the usual strategy of repeating antecedent information will not work. To establish unambiguous referents, something more is required, some new information or some adjustment in the meaning of the existing text.

In one study, 30 sixth and 30 seventh graders were given three examples of each type of paragraph to revise. Of the texts with differentiating information, these children attempted to change about sixty-two percent of the ambiguous sentences and of these attempts, ninety-five percent were successful.* Almost invariably, the correct solution involved the strategy of repeating an existing antecedent noun phrase -- in this case, the characters' names. Working on texts without differentiating information, these children attempted to change fifty-two percent of the ambiguous sentences, which indicates that these children were about as likely to detect ambiguity in the one kind of text as in the other. Successful solutions were less common however. Of the ninty-three attempts to change these sentences, only fifty-one (fifty-eight percent) were successful.

Why did so many attempts fail? Most of the time, when children failed they did so because they were attempting to use the familiar strategy of repeating an antecedent noun phrase, apparently without taking the particular context into account. For example, the majority of poor solutions to the text above involved an attempt to repeat the antecedents a boy, another boy:

> Text:
> A boy lived on Elm Street. Another boy lived next door. The boy had a new bike and wouldn't let the other boy ride it.
>
> Solutions:
> ...The other boy had a new bike and wouldn't let the boy ride it.
> ...The other boy had a new bike and wouldn't let the other boy ride it.

*Attempts were judged successful if two coders agreed that the resulting text was no longer ambiguous.

The problem, of course, is that other requires contexts in which alternatives are clearly designated, and in this case the referent for the alternate noun phrase (the boy) remains unclear.

To solve the problem, a writer had to add new differentiating information or change the basic meaning of the text in some way. About twenty-five percent of the solutions were based on some change of meaning: children either deleted the ambiguous sentence or if they kept it, declined to make any definite reference:

> ...One boy had a new bike and wouldn't let the other boy ride it.

In the majority of cases, however, writers constructed referring expressions based on addition of new information:

> A boy named Charlie lived on Elm Street. Another boy lived next door. Charlie had a new bike....

Results from a number of studies suggest that the insertion of new information into existing text is quite difficult for elementary and junior high school students. For example, Champagne, Scardamalia, Bereiter, and Fine (n.d.) found the third, sixth, and ninth graders had difficulty incorporating new information into their revisions of simple one-and two-sentence texts. Similarly, in his studies of the development of revision skills in first and third graders, Graves, (1979) has found that the strategy of revising by inserting information into a text develops long after children have already become adept at making deletions and adding new information as a continuation of a text. There is evidence in our data that making insertions is difficult, that even when children realized such a strategy was necessary, they were sometimes unable to carry it out. Consider, for example, this heroic attempt:

> Joe lived on Elm Street. Another Joe lived next door. Joe had a new bike and he wouldn't let the other Joe ride it...

These basic results have now been replicated with a group of 50 fourth graders and two additional groups of 20 sixth and seventh graders. In each case, texts without differentiating information proved more difficult to clarify. Most of the time, children seemed to run into trouble either because they attempted to apply a familiar referencing strategy (antecedent-repetition) without taking into account the effects of the particular context or because they didn't seem to understand how the alternate strategy of inserting new information into text actually works.

Co-referencing is, of course, only one type of relation among elements in a text. Writers must learn to signal many other sorts of relations as well. As far as I know, data concerning the development of strategies for constructing other types of text relations are simply not available, making it impossible for us to draw any general conclusions about the development of skill in constructing coherent text. Nonetheless, a few tentative comments seem appropriate.

Implications for Instruction and Assessment

First of all, the evidence concerning children's ability to detect ambiguity and anomaly has implications for both assessment and instruction. Most standardized tests attempt to assess students' writing by assessing students' skill in revising assorted tester-prepared texts, presumably on the assumption that revision provides a reasonable estimate of writing

skill and revision of another's text, a reasonable estimate of skill in revising one's own. Disregarding the validity of the first assumption for the moment, our data suggest that the second is probably ill-founded. Although revising tester-prepared texts may reasonably assess children's skill in detecting syntactic anomalies, such tests will seriously underestimate students' difficulties in handling referential ambiguity, at least in the elementary and junior high school years. Also, the ability to monitor one's own text apparently may call on a rather different set of cognitive skills, including an ability to put aside intended meaning and interpret text with just the information actually available to a reader in the words. As we have noted, this kind of perception is known to be difficult for elementary students and may in fact prove to be difficult for adults as well.

Apart from assessment, the data also have implications for instruction. Given the differences between the two types of editing, it is clear that practice in the one may not lead to skill in the other. Initially, it may be easier for students to perceive ambiguities and anomalies in the texts of others, and this may therefore be a good place for instruction to start. But if students are to become skilled in monitoring their own texts, they need considerable practice in doing this, quite apart from any practice they may have with other teacher- or student-generated materials.

Evidence from some of the other studies suggests that while elementary and junior high school students may have developed a number of basic strategies for achieving coherent text, they still need practice adapting these to the requirements of more challenging or unusual contexts. For example, while students seemed able to accomplish unambiguous referencing most of the time, they had difficulty in situations where they had to differentiate between two same sex characters, particularly in contexts where little differentiating information was otherwise available. This suggests that elementary and junior high school students would benefit from practice constructing referencing in some of these more challenging contexts. One important goal here would be to help children appreciate just how their usual strategies might fail and how alternate strategies might work to overcome these limitations.

It seems to me that children are more likely to gain an appreciation of how language functions to accomplish efficient and coherent text if instruction is actually organized around these functions. Typically, language instruction is organized in terms of syntax and especially parts of speech, even though many writing problems are more usefully conceptualized in terms of alternate ways of signaling various types of cohesive ties or text relations. Thus, for example, language instruction may be more relevant to the needs of a writer if it is organized around alternative means of accomplishing such functions as co-referencing, parallel organizations, or contrasts rather than analyses of such syntactic structures as adjectives or nouns. (For suggestions as to how such an approach to language instruction might be organized, the interested reader will want to consult Traugott and Pratt's 1980 introductory text on linguistics, particularly chapters five, six, and seven, as well as Halliday and Hasan's 1976 seminal grammar of text cohesion.)

Chapter 4

Learning to Write

Writing and Speaking

Most beginners come to writing with a well-developed set of conversational skills, and it is only sensible for them to try to adapt these old skills to the new task of writing. Unfortunately, many of the conventions and strategies appropriate for conversation turn out to be quite ill-suited to the needs of writing. One principal task for a beginner, then, is to come to appreciate just how the two differ and to learn some of the new communicative strategies appropriate to writing.

On the surface, at least, the differences between conversation and writing are obvious enough. For one thing, the language systems of speakers and writers have very different physical properties. Speech is aural and evanescent; writing, visual and relatively permanent. Speech conveys its meaning through a number of features, such as changes in pitch, rhythm, and loudness, which are not directly translated into writing. At the same time, the communicative activities of writers and conversational speakers occur under rather different physical constraints. Conversation involves relatively short exchanges among participants who share a physical and temporal space. By contrast, writing is a solitary activity, often involving the composition of extended portions of text for an absent reader who will receive it only after considerable time has elapsed.

These differences may seem trivial, especially when compared with the more striking fact that speakers and writers do, after all, share a common syntax and vocabulary, but they nonetheless result in some very large and important differences in the strategies through which spoken and written communication occur. In the following pages, I will discuss four that seem to pose particular problems to the young beginner.

Solo Performance

First of all, it seems that young beginners often have difficulty coping with the fact that writing involves a solo performance. By and large, conversation is a collaborative enterprise. Since participants generally share the same temporal and physical space,* they are free to query, clarify, and elaborate on each other's communications as well as incorporate each other's language through the use of ellipsis, repetition, and pronominalization. Indeed, conversational speakers are expected to participate in this way. By contrast, most writers tend to work alone. True, writers (and particularly classroom writers) can exchange ideas and react to each other's composing efforts, but in the end, writing results in

*Participants in telephone conversations do not, of course, share a physical space, although their interactions are nonetheless collaborative.

the production of an artifact which is attributable to a single author (or set of authors) who has responsibility for its construction and who usually indicates that responsibility by signing his or her name.

The differences can create several kinds of problems for an inexperienced writer. For one thing, as part of the collaborative nature of most conversations, speakers learn to keep their contributions (or "turns") relatively short and focused on one or two aspects of a particular topic. Expansions and elaborations, when they occur, generally come as a result of some query or challenge from other participants. As a result, beginners may feel uneasy with the task of filling up a "communicative space" entirely with their own messages. They may have difficulty settling on an appropriate length for their writings, particularly where the text forms are relatively unfamiliar. They also may lack appropriate techniques for elaborating or expanding on their own ideas. Bereiter (1979) reports this to be a problem in the expository writings of school-age children and Shaughnessy (1977, especially chapter 7) finds this to be a problem for adult beginners as well.

High Standards of Lexical and Syntactic Precision

A second problem for the beginner lies in the fact that writers cannot rely on nonlinguistic cues in order to establish a meaning for their texts. In most situations, conversational speakers can convey meaning with a number of extralinguistic cues, including intonation, facial expression, and gesture. These can often enable listeners to achieve an intended interpretation, despite considerable vagueness and ambiguity in the actual language itself. Consider, for example, this exchange taken from a family dinner conversation:

> Father: Maybe before the party, we can locate, uh, the flash, uh, light, you know. I mean the, my, uh...
> Mohter: Can you make it a real effort?
> Father: Yeah, for the camera. Because I, I don't uh...
> Mother: It won't work without it?
> Father: I have to use all the available daylight then.
> Mother: What about fast film?
> Father: Well, that isn't as good, you don't really get rid of all the shadows.

On paper, much of the language is ambiguous, but the participants apparently understood each other. The dialogue continues without any interruptions for clarification, presumably because the participants are relying on various extralinguistic cues.

Writers cannot, of course, rely on these resources. Although they can provide pictures for their texts, as most beginners do, they will be expected to convey more and more of their meanings via words as they mature. Generally, this means that beginners must learn to adopt standards of lexical and syntactic precision that may be considerably higher than those required in conversational interaction. Thus, for example, the child who has come to rely on general nouns and deictic terms (such as thing, someone, kid, this, that, there, here) will have to develop more specific wordings for texts, and it may take considerable practice before new strategies for selecting wording are learned.

Deliberation and Revision

Beginners must also come to appreciate the fact that writing, far more than conversation, is a product of deliberation and choice. For the most

part, speech occurs rapidly. It is evanescent. Our memory for the exact wording of a spoken utterance is likely to decay rapidly once the utterance has been comprehended, and unless the speech has been tape-recorded, there is no way for a participant to go back and re-examine what was actually said. Conversationalists may elaborate and amend what was said, but they cannot actually erase or redo a message. As a result, conversational strategies do not include a notion of revision.

By contrast, revision lies at the very heart of the writing process, and one of the most crucial tasks for a beginner is to realize that much of what seemed unalterable in speaking is, in writing, open to endless deliberation and change. There are a number of reasons why this should be so. For one thing, writing is simply more available for scrutiny and reflection. While our memory for exact wording of written text will decay about as rapidly as our memory for speech, our knowledge of written text is not limitd by our memory. The text is there to be re-examined long after it has been read. In addition, since writing is produced less rapidly than speech and in a slower time frame, decision processes are more likely to be available for conscious awareness. This, in turn, makes it more likely that deliberation and revision will occur. Finally, as we have noted, writers are under more pressure to be precise and explicit in their choice of syntax and vocabulary, a constraint that may also lead to more deliberation and revision.

What a beginner must realize, is that unlike speech, writing is subject to any amount of revision. This realization can eventually evolve into a notion of systematic phases in the production of text: rough notes, first drafts, final copy, and so forth. What is at stake is not so much the notion that text can be corrected (although this is certainly part of the writing process), but the more basic concept that texts evolve and that unlike conversation, text need not be produced all at once at a single pass.

We know as yet very little about how the notion of revision develops and even less about how that notion evolves into the concept of distinct writing phases. We know from the work of Graves and his colleagues that even first and second graders spend a considerable amount of their "writing" time scanning or rereading segments of their on-going compositions and that even these youngest beginners make occasional changes in their texts (e.g., Graves, 1973). This indicates that some sort of evaluative behavior is part of the writing process virtually from the beginning. Most of these early revisions are quite circumscribed, involving no more than a word or two and resulting from no more than a simple proofreading of the text (Graves, 1979). It is not until children have had considerable writing experience that they begin to make more extensive changes involving substantial rearrangement of content and language (see, for example, the excellent account of one child's developing concept of revision in Calkins,

In part, the lengthy development of the concept of revision may be due to children's problems with the mechanics - erasing, inserting, making room, copying over - all of which may seem quite overwhelming to a young beginner who has yet to master the basics of transcription. Even if some of these problems could be solved (if, for example, children could use automatic word processors to relieve some of the burden), it is clear from Calkins' study that apart from mechanics, children still need to develop an appreciation of the extent to which text is revisable. For example, even when Calkins' nine-year-old youngster had come to understand that she could alternate beginnings for a story, she initially produced only alternate starting points for what amounted to the same sequencing of events. Months passed before her revisions began to reflect genuine alternatives in content organization.

The point, again, is that learning to write involves the fundamental notion that text, unlike speech, is essentially a product of revision. The notion is somewhat paradoxical because it suggests that speech, which is nontangible and evanescent, is nonetheless unchangeable, while writing, which is tangible and relatively permanent, is subject to any amount of revision.

Systematic Phases in the Production of Text

This leads us to our final point, which is simply that unlike conversation, texts done by experienced writers are produced in phases. For example, an experienced writer initially might go through an outline or rough-note phase in which efforts are focused on the generation of ideas: brain-storming, free association, discussion, role play, as well as a variety of research activities that may extend over long periods of time. At a later, first-draft stage, a writer might focus less on idea generation than on some integration of topic ideas with a plan for the discourse. In still later drafts, the focus is likely to switch to lexical and syntactic problems, and finally, to problems of spelling and punctuation. The point is that experienced writers frequently deal with the complexities of the writing task by adopting the very sensible strategy of divide and conquer.

Beginners, on the other hand, are likely to rely on what they have learned about conversation and figure that they are expected to produce their finished texts on a single pass, tackling all composition problems at once. At best, this can turn writing into a task that is far more onerous and frustrating than it really need be. At worst, the burden of producing finished copy all at once can prevent writers from producing anything at all.

Unfortunately, beginners are given few opportunities to learn how to organize their behavior. Some eventually manage, by trial and error, to figure out that writing, because of its revisability, can be produced in phases. But as Shaughnessy (1977) has pointed out, many never seem to learn and at age twenty approach writing with the same unrealistic and unproductive expectations that they must have brought to the task at the age of seven or eight.

Implications for Instruction

For the beginner, then, exposure to realistic notions of how to produce text must be at least as important as exposure to a wide range of genres or strategies for coherent wording. These notions can be fostered in several ways. For one thing, beginners may benefit from opportunities to talk with experienced writers about their work. Some readings may also be useful. Passages from some of the interviews in the Writers at Work volumes (e.g., Cowley, 1977) provide important insights into the way in which many of our greatest contemporary writers have learned to organize their work.

Young writers may also find it useful to swap tricks-of-the-trade with other students who are only slightly more experienced. These more advanced students may have greater insight into the problems of less experienced beginners, having only recently encountered the problems themselves. Generally, then, it may be useful for students to meet in mixed-age or mixed-level groupings from time to time, both to share and evaluate texts and to share ideas about various aspects of the composing process.

Older elementary and junior high school students may also benefit from opportunities to discuss their individual writing strategies with teachers or writing "coaches." The point would be not so much an evaluation of the finished text as an evaluation of the techniques and strategies that individual writers used in putting together their texts. One way of approach-

ing such a session would be to have students talk about their thoughts, plans, and intentions during the actual compositon of a text. Such an approach has been used with great success by Flower and Hayes in their research on the composing behaviors of adult writers. Their analyses of writers' comments have yielded important insights into the kind of problem-solving undertaken by more and less skilled adult writers. Students, together with their teachers, might benefit from undertaking a similar analysis of their own "talking aloud" sessions (see Flower and Hayes, 1979; Flower and Hayes, in press).

Finally, we might note that our discussion has certain implications concerning the effects of speaking practice on writing. Clearly, speech and writing draw on a common knowledge of grammar and vocabulary. What I have tried to emphasize in this section, however, is the fact that writing and conversational speaking draw on this knowledge in different ways. For one thing, writing seems to require a more deliberate selection, analysis, and evaluation of language. There are differences in participant roles as well, with writers functioning in a more solitary fashion to produce communications that may have very different purposes and follow different conventions from those governing conversation. What these differences suggest is that learning to write involves practice in making the kinds of decisions writers make and that these differ in substantial ways from those made during conversation. One important implication for instruction is that there may be less transfer from spoken to written discourse than teachers might expect, particularly for beginners.

Chapter 5

A Brief Summary

Our discussion has focused on three aspects of writing development: children's knowledge of text structure and their use of that knowledge in formulating plans for the organization of content in a given text; children's skill in constructing coherent wording for their texts; and children's appreciation of the communication strategies appropriate to writing.

As we have seen, the writings of school age children reflect considerable knowledge of certain discourse structures, especially knowledge of simple narratives and expository forms. Although we are reasonably certain that elementary age children have some knowledge of these structural properties, we have virtually no information as yet about how that knowledge might be acquired. In particular, we know little about the effects of practice: how much exposure to a form is necessary before children begin to acquire some knowledge of its principal features, and to what extent does reading in a particular form provide a child with the knowledge required for composing? Nor do we know much about the characteristics that make knowledge of a particular form more or less difficult to acquire: are some forms more readily acquired than others; which aspects seem to make a difference? We might expect, for example, that highly repetitive and clearly marked forms (such as the Fortunately text, page 5) might be more readily acquired and that exposure to many similar versions of a type of text might facilitate learning, but these are as yet only speculations. Generally, we know from studies of syntactic development that young children are amazingly adept at acquiring knowledge of syntactic structure. Whether they will prove to be equally efficient at learning about discourse structures remains to be seen.

Even if children's writings reflect certain structural knowledge, it is still unclear how that knowledge is used during composition. Is it a tacit knowledge, or is it available for conscious reflection and articulation? To what extent do children deliberately plan and compose in terms of structural features? We know from the work of Flower and Hayes that mature college age writers frequently plan and discuss their work in terms of structural units: e.g., they speak about plans for composing introductions, generalizations, examples, summaries, and so forth. We assume that such deliberate planning of writing goals helps writers maintain consistent discourse structures throughout the lengthy and complicated process of composition, but we have little information about when writers begin to represent their task in this way and how knowledge becomes available for conscious reflection. Existing research suggests that while individuals differ markedly in the ease with which conscious awareness of language features spontaneously develops, such awareness can also be deliberately provoked. Sinclair (1978), for example, reports that surprising events — successes or failures — can sometimes trigger conscious awareness of rela-

tions on nonverbal tasks, and she suggests that knowledge of success and failure may also aid in the development of awareness in language, with comments and questions from teachers and peers serving to provoke that knowledge. In support of such a notion is an observation by Read (1978) who notes that often no more than a question is needed to bring a phonological feature of language to a child's awareness, even in cases where the child has probably never been aware of the feature before (for other examples, see reports in Sinclair, Jarvella, Levelt, 1978).

Knowledge of conventional text structure provides writers with an important framework around which to organize the selection and arrangement of potential content. As we have seen, before potential content becomes a text, writers must transform it into some appropriate wording. Crucial to this process is a writer's skill in selecting the cohesive devices that tell a reader how the elements in a text are to be integrated (e.g., devices indicating that two noun phrases have the same referent or that two items are in contrast or parallel).

By the middle elementary years, most students have a basic understanding of how these devices work, since their texts are not generally incoherent. However, wordings that are ambiguous or misleading do crop up in the writings of most children at least through the junior high school years. Existing data indicate that we can attribute the persistence of these errors to at least three different sorts of problems. In the first place, it is more difficult to accomplish coherence in certain contexts, due to the fact that in these contexts some preferred wordings will not work. For example, it may be difficult for young writers to accomplish co-referencing in contexts where two same sex characters must be differentiated because pronouns will not make the intended differentiation: Jane and Sue went to the store. She got some soap. Even when writers make an effort to correct their faulty texts, certain kinds of problems will be extremely difficult to detect, especially those involving referential ambiguity.

At the same time, certain kinds of corrections will be more difficult than others for young writers to carry out. For example, corrections that require writers to insert new information into the midst of an already formed text appear to be more difficult to execute that those that require deletion of a portion of text or a continuation of the text without interrupting. There is little information about how children develop skill in constructing coherent text. I have suggested that children might benefit from instruction which is organized around text cohesion rather than syntactic analysis. For example, lessons could focus on problems in establishing co-reference or logical relations with instruction geared to helping children select among alternative linguistic devices for accomplishing a given cohesion task. More generally, the goal of such instruction would be to develop children's awareness of linguistic alternatives and of the role that context plays in choosing among them.

Finally, we have discussed some of the difficulties that beginners are likely to encounter as they approach the task of producing written text. Because writing and speaking draw on different communication strategies, many beginners may need help in organizing their writing behaviors to reflect these new strategies. They would probably benefit from opportunities to discuss their problems with more experienced writers.

The preceding discussions have a number of implications for education. Throughout, I have stressed a functional approach to writing instruction organized around the notion of writing as a particular kind of problem-solving activity. The purpose of this approach is to help children begin to think like writers and to view writing as a series of problems in text organization and wording.

In implementing this sort of functional approach, several strategies

are likely to prove useful. For one thing, it may be useful to keep the goals of particular assignments simple and well-articulated: e.g., if a primary goal is to help a student appreciate the difference between producing rough and polished drafts, then one need not also expect that a student produce an example of his or her very best writing. Just as the game of a golfer or tennis player may temporarily deteriorate while he or she is attempting to change a particular stroke, so the overall quality of a student's text may deteriorate, at least temporarily, while the student attempts to do things in a new way.

Along with appropriate and well-defined lesson aims, it is also important to provide many opportunities for students to articulate their strategies and plans. While knowledge of much of what we do during composition must remain tacit, many of our goals can become available for conscious reflection and this is likely to benefit students in at least two ways. For one thing, a writer with a well-articulated set of purposes is likely to find it easier to sustain a consistent course of action during the many interruptions and shifts in attention that inevitably accompany composition. Similiarly, well-articulated purposes are likely to make it easier for writers to identify errors and construct revision strategies. Apart from this, well-articulated goals also provide writers with a vocabulary for exploring and sharing ideas about text with others.

One obvious way to promote the articulation of goals and strategies is to have students meet regularly in small "editing groups" to consider each other's text. At the same time they could exchange ideas about the process of writing by describing their own experiences with various problem-solving procedures and by swapping information about especially effective tricks-of-the-trade (see suggestions in Moffett, 1968, and in Graves, 1978). While such sessions would serve the obvious and very useful purpose of enabling participants to exchange information, they also would provide an equally useful occasion for students to develop their awareness of concepts and plans by attempting to articulate these for others.

This discussion has emphasised the importance of organizing instruction around problems in text construction, either at the level of content organization or wording. The instruction should be aimed at helping children develop the very important awareness that there are alternate solutions and, in a very real sense, to conceive of writing as a choosing among these alternatives.

Writing is hard, and learning to write is probably one of the most intellectually demanding tasks that any person is likely to undertake. In a sense, the purpose of this discussion has been to indicate some of the ways in which these two statements might be true. It should be evident that learning to write is still very much a mysterious process. Nevertheless, I have indicated in a very general way some of the concepts and considerations that enter into writing, in the hope that this might clarify some of the ways in which development is likely to occur and some of the ways in which we can best foster that growth.

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Appendix F

Editing Stimuli

I. Texts containing ambiguous pronouns:

1. Policemen sometimes have special jobs. Once there was a policeman who was supposed to chase robbers. One day, he got into a police car and drove to the city to catch a robber. They had a big fight. He was killed.

2. Sally and Joan were good friends. They were always together. They often went skating and they went to the movies together too. She was always happy to see her. But one day, they had a fight and after that, they decided not to be friends anymore.

3. My friend Robert wasn't in school. The teacher said he broke his leg. After school I went to his house. His mother said he was in the hospital. The next day I went to school. She said, "Robert will be back soon." When Robert came back, we had a party for him.

II. Texts containing an ambiguous noun and an ambiguous pronoun

1. A boy lived on Elm Street. Another boy lived next door. The boy had a new bike and wouldn't let him ride it. They had a big fight about it. They were so mad they didn't speak for a whole week. They should have shared the bike.

2. One day a girl went to the movies. After the movies, she decided to get something to eat. She went into a restaurant. The girl was not paying attention and did not see her. They really bumped into each other.

3. One day a man left his house. Another man was standing outside. The man took out a letter and gave it to him. They talked for a while and then they got into a car. They were both policemen. They were going to catch a thief.

III. Texts containing missing subjects or predicates:

1. One day I met my friend Sam in the park. We both had skateboards. We set up an obstacle course and the person who could go the fastest. I went pretty fast but my friend Sam went even faster.

2. A man was going to the movies. Later was going to meet his wife. They were going to have a Chinese dinner and then take a subway home. But when the man got into the movies he saw that he had no money. He had left it at home.

IV. Texts containing an ambiguous noun and an ambiguous pronoun with disambiguating information (Names)

1. A girl named Linda lived on State Street. Another girl named Jane lived next door. The girl had a new sled and wouldn't let her ride on it. They argued about it for a long time. Finally they agreed to share the sled. After that they became best friends.

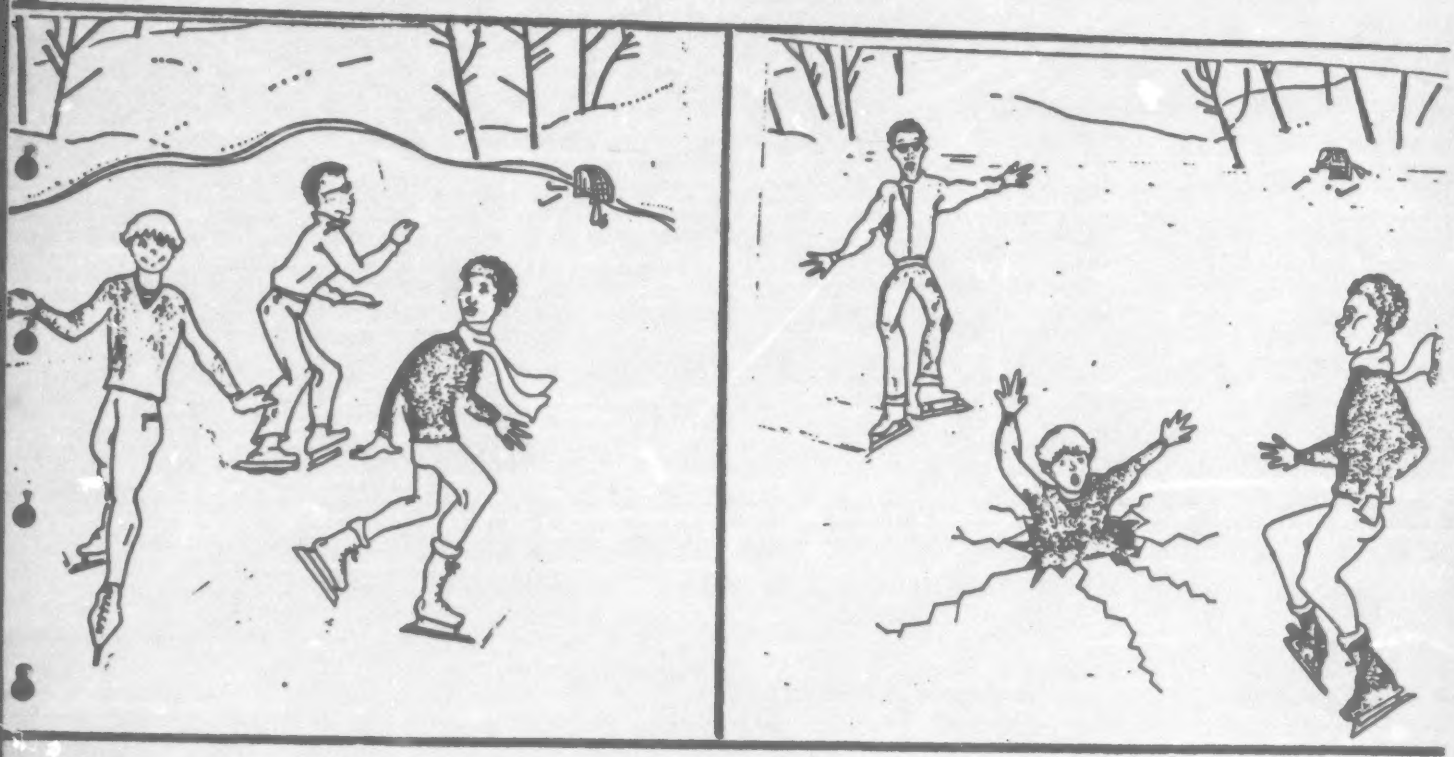
2. One day a boy named Harry went to the circus. After the circus he decided to buy a new suit. He went into a department store. Another boy named Sam was also going into the store. The boy was not paying attention and did not see him. They really bumped into each other.

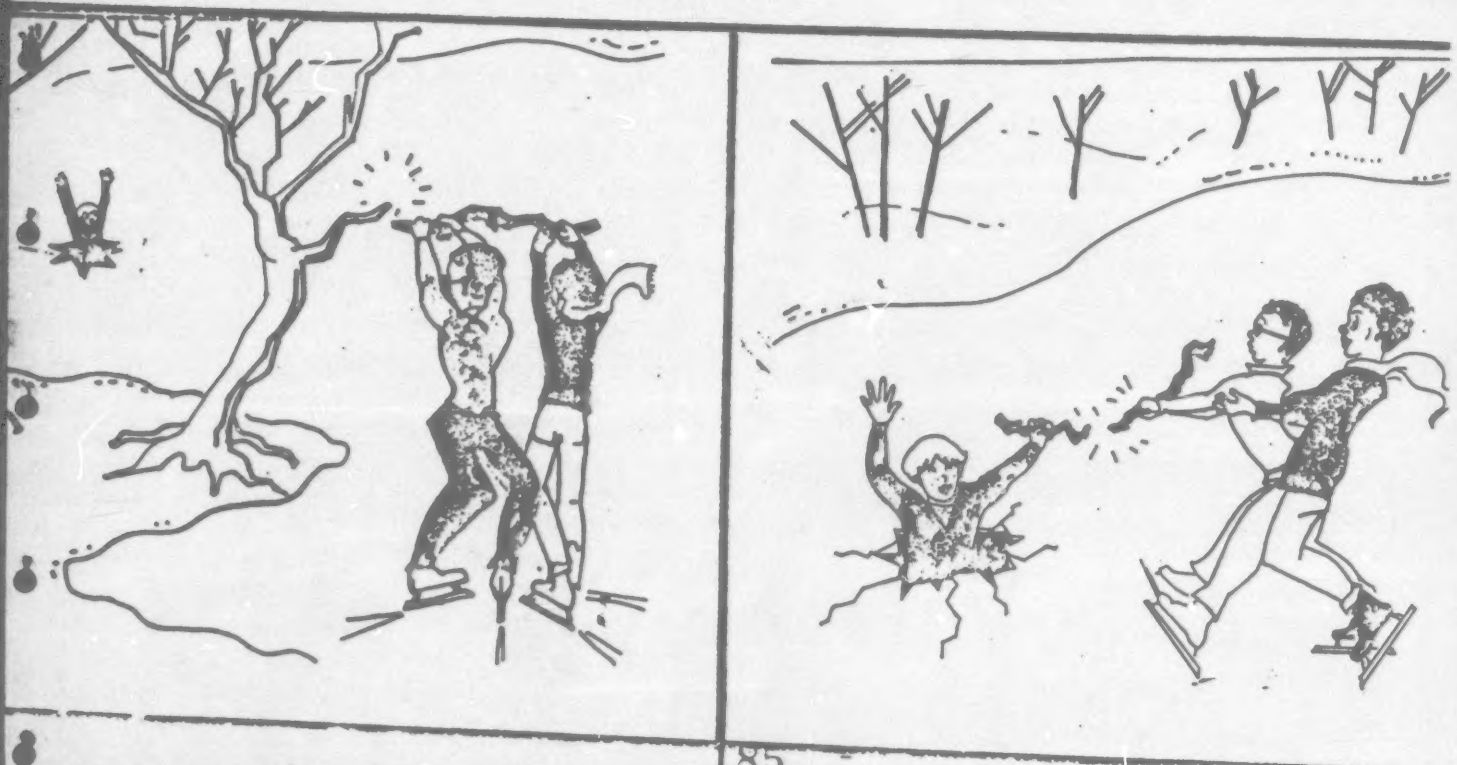
3. One day a girl named Susan left her house. Another girl named Judy was standing outside. The girl took out a package and gave it to her. They whispered something and then they started off down the street. They were going to a surprise birthday party for their best friend.

Appendix G

Cartoon Stimuli

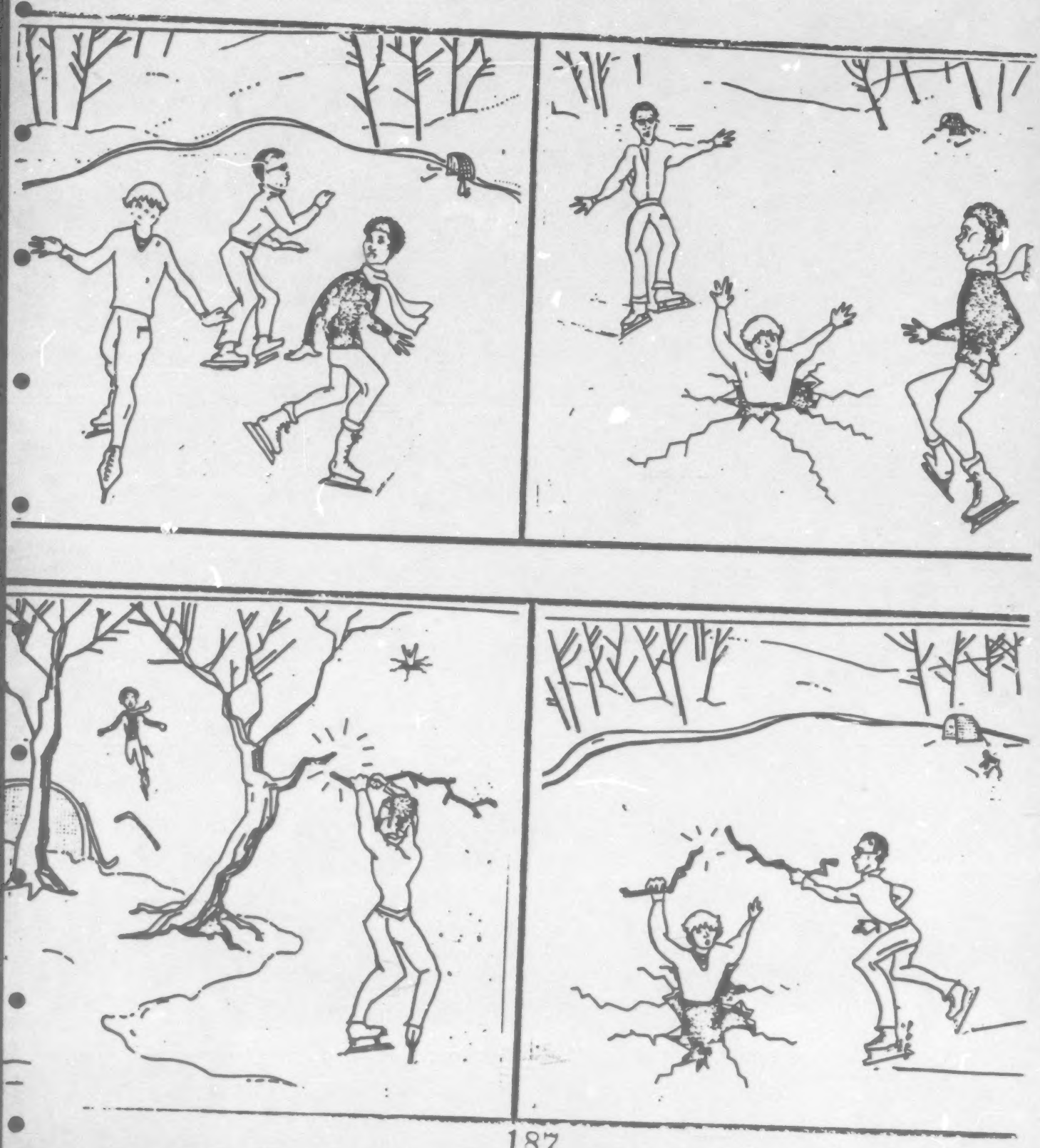
Easy-context cartoon, Ice skating version



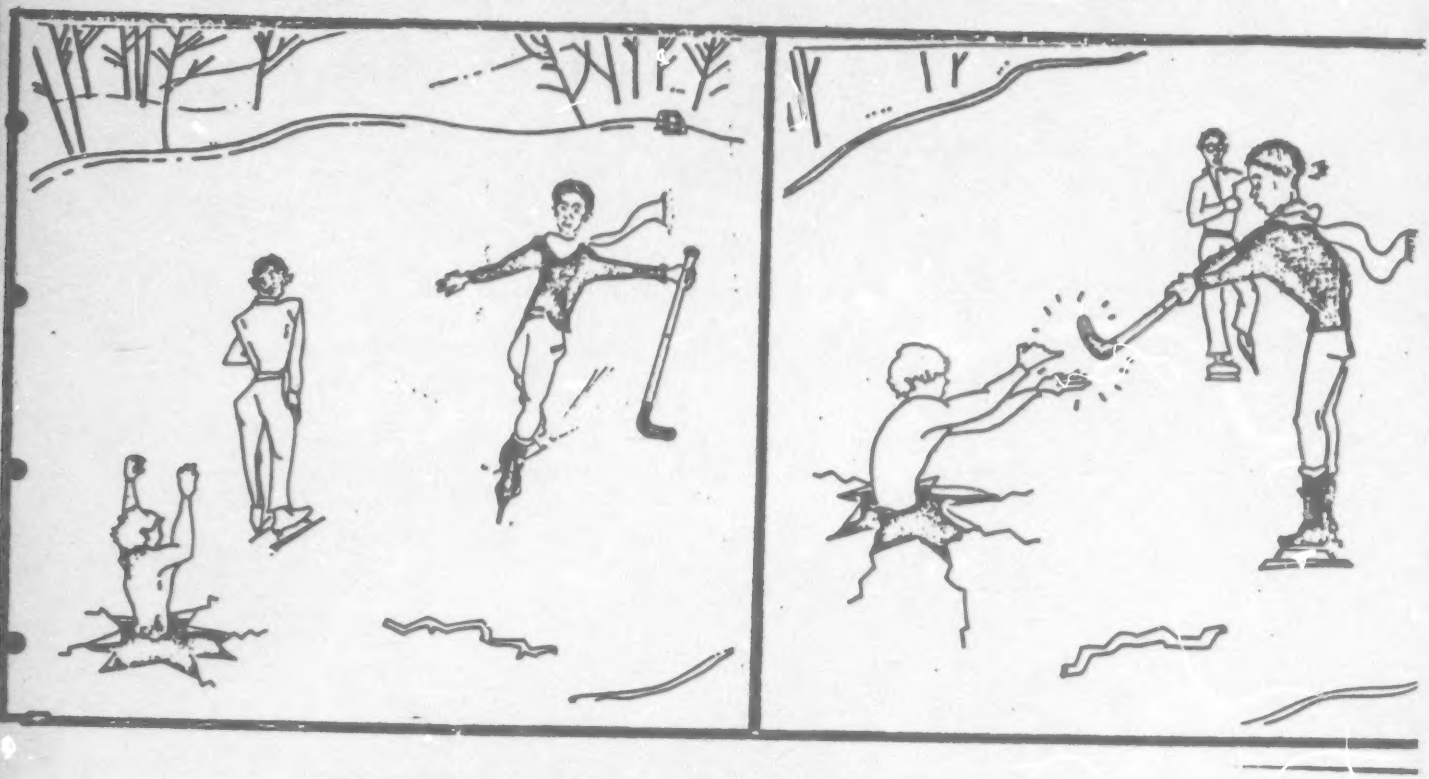


Easy-context cartoon, Ice skating version (cont.)

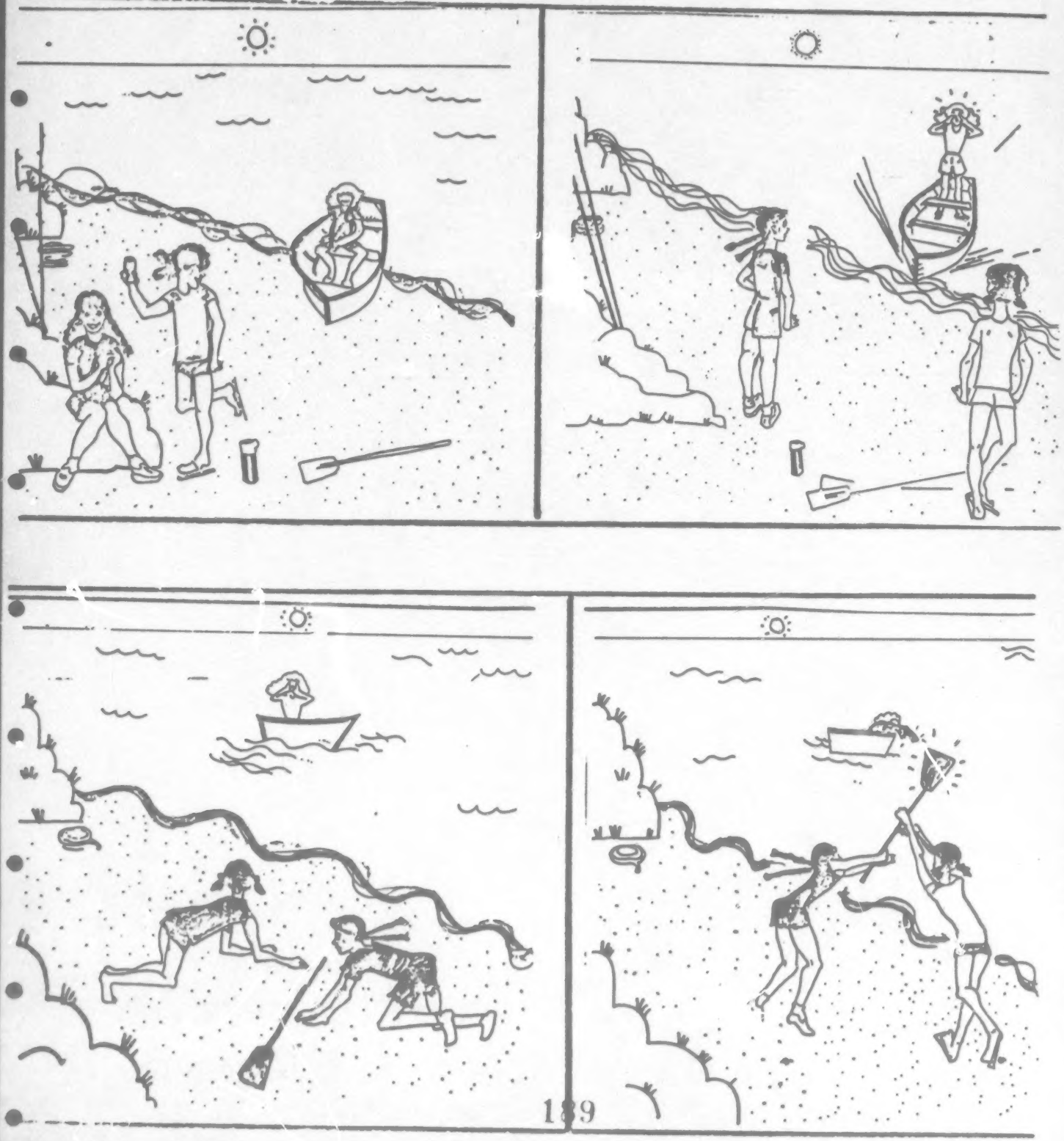
Difficult-context cartoon, Ice skating version



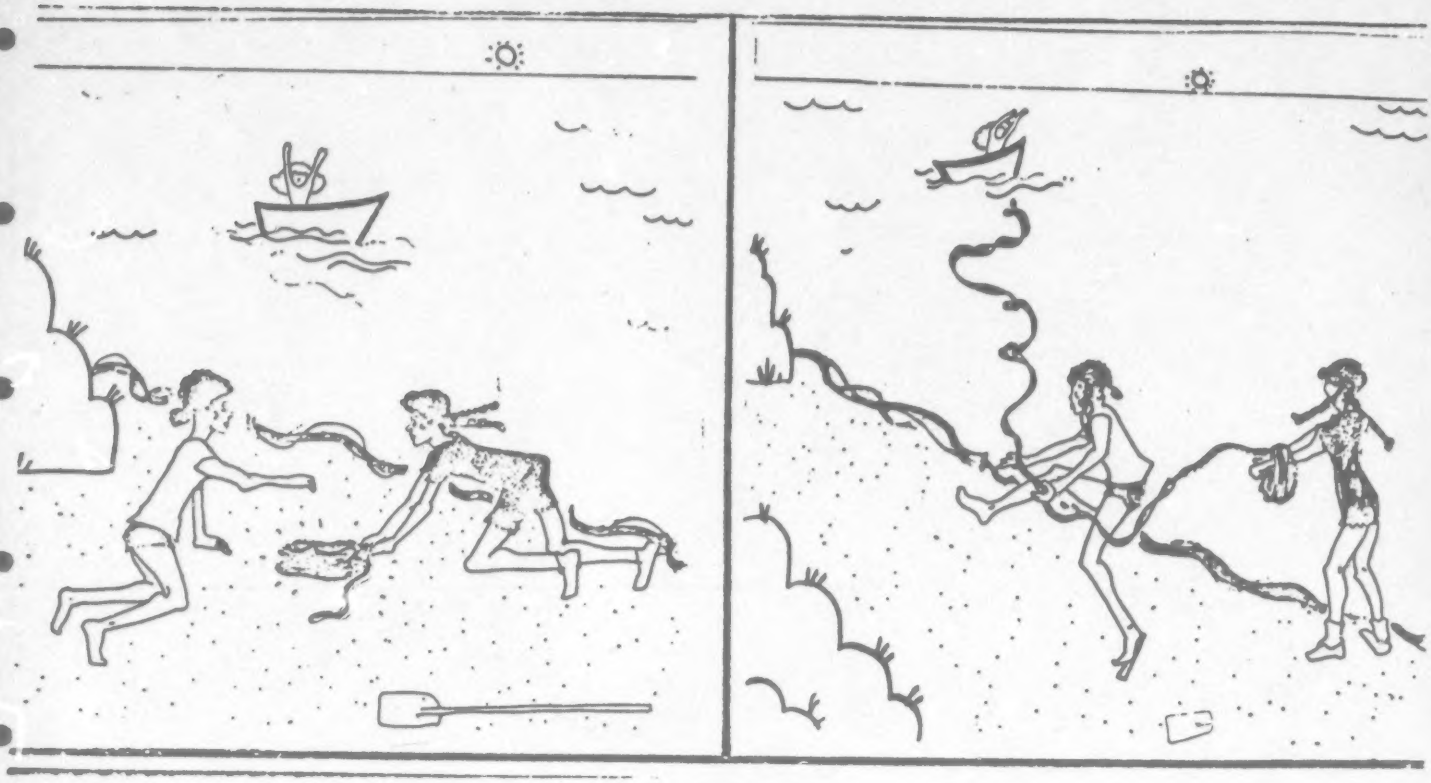
Difficult-context cartoon, Ice skating version (cont.)



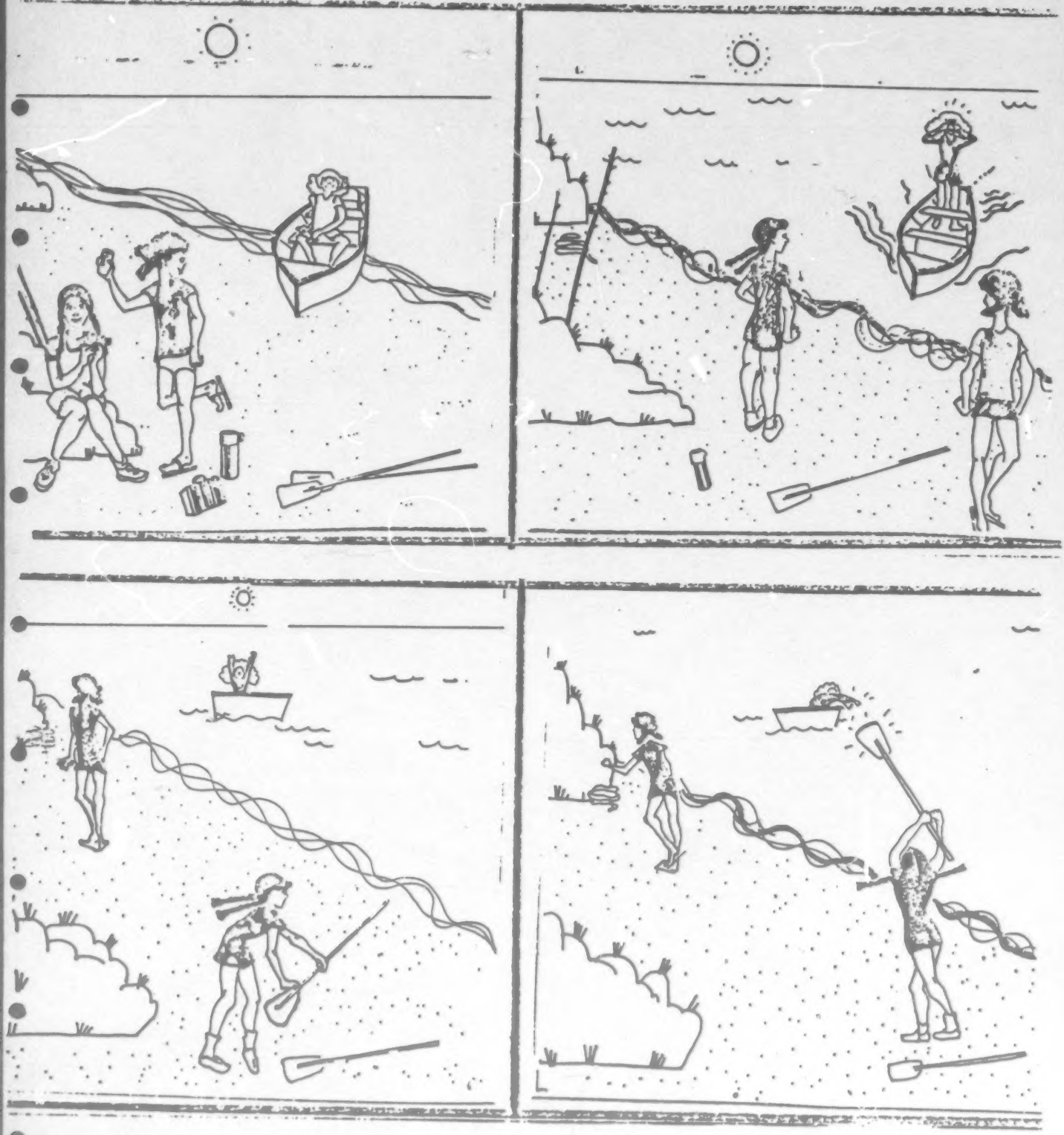
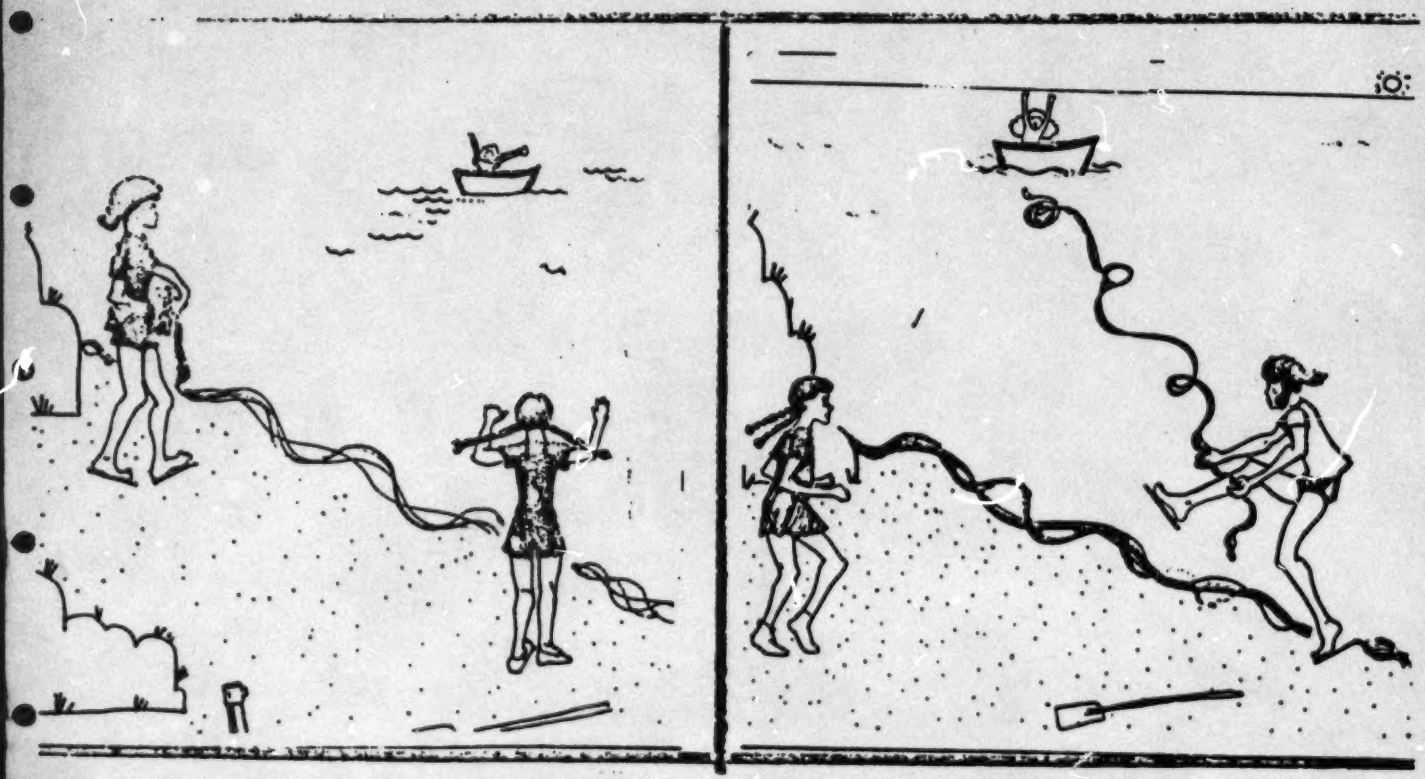
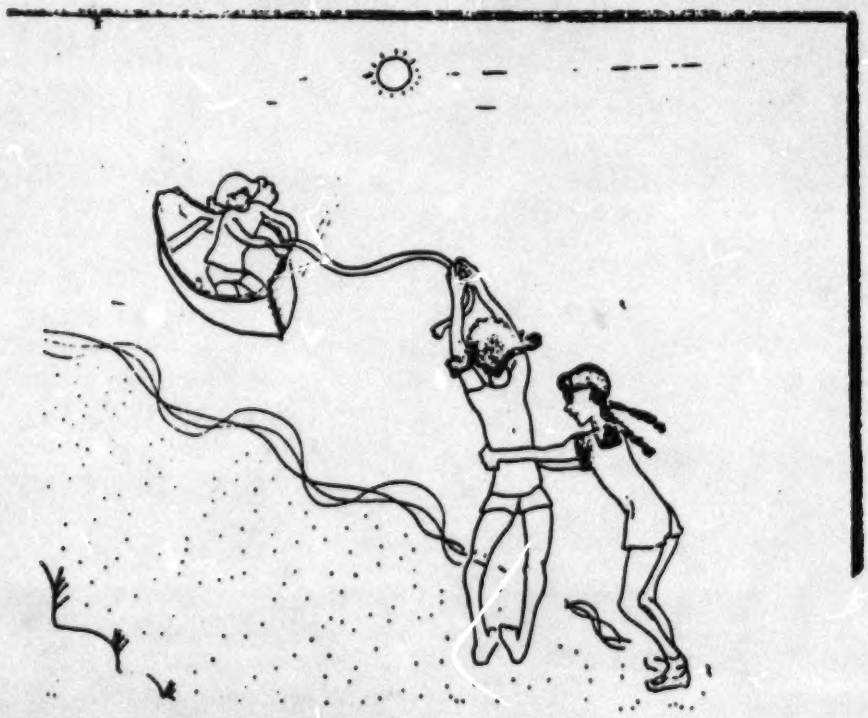
Easy-context cartoon, Boating version



Easy-context cartoon, Boating version (cont.)



Difficult-context cartoon, Boating version



Difficult-context cartoon, Boating version (cont.)